# Australian Model Engineering

September-October 2003

Issue 110

$6.50*
(inc. GST)
NZ$9.50*
(inc. GST)

2003 Bendigo Model Expo

LOCOMOTIVES, TRACTION & STATIONARY ENGINES, BOATS, WORKSHOP, PRODUCTS, CLUB NEWS & EVENTS, REVIEWS

**In This Issue:**
- ☑ Echuca's 40th Steam, Horse & Vintage Rally
- ☑ Adjustable Workstand for the Bandsaw
- ☑ A Battery Powered Pennsylvania DD1 Locomotive

ISSN 0819-4734
05
9 770819 473012

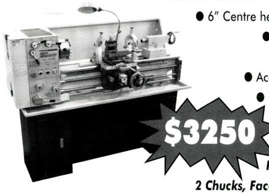
Print Post Approved Publication No PP228582/00001

*Recommended Retail Price

# HAFCO Workshop Equipment

AME140903

## AL330A GEARED HEAD LATHE

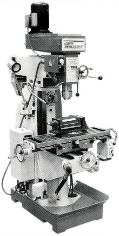


- 6″ Centre height, 36″ centres
- 9 speed 240volt
- Weight 380kg
- Accuracy guarantee
- Exceptional value

**$3250**

***PRICE INCLUDES***
***2 Chucks, Faceplate, steadies***
***worklamp, drill chuck, splash guard and stand***

## HM50/52 MILL DRILL



- H/Duty 2HP 240V
- 30INT spindle
- 30INT Horizontal spindle (HM52)
- Table 1000mm x 240mm

***INCLUDES:***

- X axis powerfeed
- Halogen Lamp
- 6″ Machine vice
- Coolant system
- Metric collet chuck & set (4-16mm)

***HM50-240V*** **$3995**
***HM52-240/415V*** **$4995**

## AUTO PARTS WASHER

- Large 90litre solvent capacity
- 240volt pump gives output of 220litres per hour
- Tank 760 x 540 x 310mm
- Weight 35kg

**$169** (A368)

**Bench Model $89** (A370)

## BS4A METAL BANDSAW

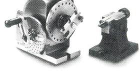
- 125mm capacity
- Heavy duty 240V
- 4-speed auto cut out
- Cast iron construction
- Vertical cutting plate
- Portable on wheels

**$299** (B002)

## DIVIDING HEADS

- Hardened & Ground spindle & worm
- Ratio 40:1
- Can divide direct or indirect
- Head tilts to 90°

100mm (4″) **$529** (D001)
125mm (5″) **$729** (D002)



## MEASURING EQUIPMENT

| | | |
|---|---|---|
| **M045** | Imperial dial guage 0-1″ | **$45** |
| **M046** | Metric dial guage 0-10mm | **$45** |
| **M050** | Magnetic base Std | **$44** |
| **M051** | Magnetic base One lock | **$79** |
| **M720** | 6″/150mm Std Vernier | **$35** |
| **M725** | 8″/200mm Std Vernier | **$45** |
| **M726** | 12″/300mm Std Vernier | **$79** |
| **M740** | 6″/150mm Digital Vernier | **$79** |
| **M742** | 8″/200mm Digital Vernier | **$99** |
| **M743** | 12″/300mm Digital Vernier | **$149** |
| **M760** | 0-1″ Micrometer | **$30** |
| **M770** | 0-25mm Micrometer | **$30** |
| **M016** | 0-100mm Micrometer set | **$119** |
| **M046** | 0-4″ Micrometer set | **$119** |

## BENCH DRILL

- 240 volt
- 3/4HP
- 16-speed with 16mm chuck
- 1mtr high

**$259** (D138)

**Pedestal Model**
**$299** (D140)

## ROTARY TABLES

- Horizontal or Vertical type
- Calibrated rim & micro vernier
- Scale dial
- Disengaging handwheel
- Adjustable back lash

| OUTSIDE DIAMETER | PRICE |
|---|---|
| 150mm(6″) | $359 |
| 200mm(8″) | $559 |
| 250mm(10″) | $649 |
| 300mm(12″) | $795 |

## FREE

***PRICED 2003 COLOUR CATALOGUE OUT NOW RING, WRITE OR FAX***

**Model steam trains, Woodslabbing**
**FREE DEMONSTRATIONS**
**Welding, Woodturning, Machining**
**and much more.....**

***OPEN ALL WEEKEND***
***DON'T MISS OUT ON OUR***
***SPECIAL ONCE A YEAR SALE!***

## SYDNEY ANNUAL 4-DAY SALE!!
## NOV 13-18, 2003

***....call us for special show prices on all HAFCO products....***

**NOTE: WA prices may be higher due to freight costs**

**HARE & FORBES MACHINERYHOUSE**
established 1930

**HMC**
***Herless Machinery Corporation***
established 1910

**SUPPLIERS OF NEW & USED MACHINERY AND WORKSHOP EQUIPMENT**

**NSW: 1/2 Windsor Rd, NORTHMEAD 2152**
**Ph: (02) 9890 9111 Fax: (02) 9890 4888**

**QLD: 550 Kessels Road, MACGREGOR 4109**
**Ph: (07) 3849 1888 Fax: (07) 3849 1414**

**VIC: 2099 Princes Highway, CLAYTON 3168**
**Ph: (03) 9562 8866 Fax: (03) 9562 8329**

**WA: FIORA MACHINERY SALES**
**363-365 Sevenoaks Street, CANNINGTON 6107**
**Ph: (08) 9356 1811 Fax: (08) 9451 1323**

Australian Model Engineering

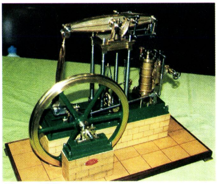
September-October 2003

Issue 110

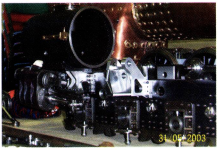
# Contents

5 Comment
9 Adjustable Workstand for the Bandsaw
12 40th Echuca Steam, Horse & Vintage Rally
15 A Small Weir Type Stationary Boiler Feed Pump — part 2
20 Steam Chest
24 *EDWIN* — part 3
28 5th National Bendigo Model Engineering Exhibition
31 Steam Power — part 3
34 Rob's Diesel — part 2
37 The *Lady Patricia*
38 Back Issues
39 The Pennsylvania DD1
40 Garratt Gossip
42 Role & Function of Rail Head Radius in 5" and 7¼" Gauge Track
45 Club Roundup
50 Coming Events
51 Steam & Steel 2004
52 Toodyay Miniature Railway Inc
Tool Bit Sharpening for the Diamond Tool Holder
53 Metrology — The Physics of Measurement
56 Sydney Live Steam Locomotive Society — Interclub Visit
57 Product Reviews
58 Tracks 'n' Trees
60 Letter Box
62 News Desk
New Subscription Form
63 Classifieds

**Page 12** Photos: Kim Jones



**Page 28** Photo: David Proctor



**Page 56** Photo: Warwick Allison

Proudly Printed in Australia

**ADVERTISING DEADLINE**
Please have your space for
**November-December 2003**
issue booked by:
**19 September 2003**

**Front cover**

*An outstanding model of a 3-abreast carousel built by Reg Thorne of Bendigo was one of many models on display at the Bendigo SME model engineering exhibition in July. For more pictures of this model and the exhibition turn to page 28.* Photo: David Proctor

# MODEL ENGINEERING SUPPLIES

*A CN 064 886 924*

**We supply a wide range of Model Engineers supplies**

**TAPS and DIES:** . . . British Association. Model Engineer, Brass.

**FASTENERS:** . . . . . BA Screws, in Standard and Small Hexagon, Cheese, Round and Countersunk heads, Nuts, Washers and all-thread. Rivets, Pins.

**MATERIALS:** . . . . . Copper, Brass, Bright Mild Steel, Stainless Steel, Silver Steel, Cast Iron, Gunmetal, Bronze, Spring Steel in all shapes and sizes.

**FITTINGS:** . . . . . . . Injectors, Pressure Gauges, Valves, Water Gauges, Pumps, Whistles, Plumbing Fittings, Lubricators, Drain Cocks.

**MISCELLANEOUS:** O-rings, Gauge Glass, Stainless Balls, Gland Packing, Springs, Tube Brushes, Filter Gauze, Laser Cut Frames.

**CASTINGS:** . . . . . . Simplex, Blowfly, VR K and J Class, Sweet Pea, Sweet William, Meter Maid, Tapping Tool, Quartering Jig, Angle Blocks and more.

**DRAWINGS:** . . . . . . Locos, Tooling, Stationary Engines, Traction Engines.

**ROLLING STOCK:** Kits for VR T Van, GY Wagon Petrol Tanker, Auto Couplers, Wheels, W Irons, Axle Boxes, Buffers and Hooks.

We offer a very friendly and efficient service.
For a FREE Price List write, phone or fax:
**Wayne Roberts**
**7 Reeves Close, Tullamarine, Vic, 3043**
**Phone: (03) 9338 7368 Fax: (03) 9330 0840**
*CREDIT CARDS WELCOME*

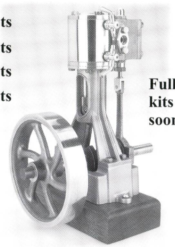
Internet: http://www.mesupplies.com.au e-mail: wayne@mesupplies.com.au

---

# Miniature Steam Pty Ltd

Bringing the Highest Quality Standards
to Model Engineering

**Casting Sets**
**Boiler Kits**
**Gaskets**
**Bolt Sets**



**Fully machined kits coming soon**

***Echuca* – single cylinder vertical**
**3/4 inch bore/stroke**

**Available From**

**Mail Orders**
**Miniature Steam Pty Ltd**
P O Box 840
Mulgrave,
Victoria, 3170

**Victoria**
**Live Steam Supplies**
26 Durham Rd
Kilsyth. VIC, 3137
(03) 9723 9722

**Queensland**
**Maddco**
46 Industrial Ave
Toowoomba, QLD, 4350
(07) 4634 5622

Trade/Dealer enquiries welcome – write to the "Mail Orders" address above.
Internet: **Miniature Steam Pty Ltd** e-mail: miniaturesteam@bigpond.com
**Live Steam Supplies**: www.users.bigpond.com/easternhobbies

---

# 30th Annual Steam Festival

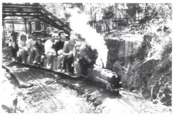
**at the**

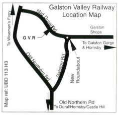
# Galston Valley Railway

29 Mid Dural Road, Galston, NSW
**Ride along a kilometre of 5" gauge rail track**
Our traction engine track is also operating

## OCTOBER 2003

**Friday 10th and Saturday 11th: AALS club members only**
**Sunday 12th: Public running 10.00am - 4.00pm**
The Sunday is our regular public running day and visiting AALS members are welcome to participate





Lunch, morning & afternoon teas available over the three days.
Night running on Friday and Saturday until 10pm.

There will also be a display of model boats, stationary steam engines, farm engines, internal combustion engines, and models under construction.
**Please remember**: totally enclosed footwear must be worn when riding on trains and traction engines.

Current boiler certificates required for steam powered models.

Proudly presented by members of the
**Hornsby Model Engineers**
**Co-operative Limited**
PO Box 172, Galston, NSW, 2519
Secretary: (02) 9484 7583
http://www.sdr.com.au/hmecl/

**Australian Model Engineering**

**http://www.ameng.com.au**

**Publisher**

*Australian Model Engineering* magazine is published 6 times per year by Australian Model Engineering Pty Ltd. (ACN 008 627 825), at 2-monthly intervals commencing with January.

**Subscriptions**

An annual subscription to *AME* costs just $38 (incl. GST) within Australia. NZ is AUD$47; all other countries, AUD$58 air. You can pay by cheque, money order, or overseas bank draft, Bankcard, MasterCard or VISA credit card. **All Mail to:**

**PO Box 21, HIGGINS,**
**ACT, 2615, AUSTRALIA**
**Phone/Fax : (+61) 2 6254 1641**

**Copyright**

All rights reserved.

Articles and drawings may be reproduced by the individual purchaser for his or her own personal use only. Otherwise, no part of this publication may be reproduced, copied, lent or re-sold without the prior permission of the publisher.

In keeping with the *Copyright Act* 1968, AME's standard policy is that copyright in articles, photographs and other graphical material is shared by Australian Model Engineering Pty Ltd and, respectively, the author; the photographer; and (jointly) the persons who sketch the original graphics and draught them for publication. This may be varied in an individual case by written agreement only. A fuller description of the policy is available from *AME*.

It is the author's duty to obtain permission for reproduction of somebody else's copyright material. Intending authors should consult *AME* in case of doubt.

**Indemnity**

Australian Model Engineering Pty Ltd or any of its principals are not responsible for the goodwill, quality of product, accuracy of information, service or the actions of advertisers appearing in this magazine. Any statements made or information given does not express or imply any warranty or endorsement of any product.

**Printing**

Proudly printed in Australia for the publisher by:
Pirion Printing, 140 Gladstone Street, Fyshwick ACT 2609 Australia

**Distribution**

Is by subscription, through hobby suppliers and by Gordon and Gotch Limited to newsagents in Australia.

**New Zealand agent:**

MBM Model Engineering
PO Box 75-153, Manurewa
Ph.: 09-235-2018, fax: 09-235-7537
www.MBMModelEngineering.com

**North American agent:**

Wise Owl Worldwide Publications
5150 Candlewood Street, Suite 1
Lakewood, CA. 90712-1900
Phone: 562-461-7574; Fax: 562-461-7212
www.wiseowlmagazines.com

**Deadlines for issue 111**

| | |
|---|---|
| **Club Roundup** | **Sept 12** |
| **Letter Box** | **Sept 15** |
| **Classified Ads** | **Sept 26** |
| **Mailout Date** | **Oct 24** |

# Comment

## It's never been so good!

It is my belief that the hobby of model engineering has never been as strong and healthy as it is now, which leads me to ponder the reasons why.

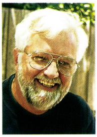
We all know that the world economy in general hasn't been too healthy over the last decade or so and I wonder to what extent that is a factor. Is it that as times get tougher people tend to stay at home more, and therefore pursue activities that they can do at home? Is it simply that because the percentage of the population now in retirement has been steadily increasing, there are more people looking for leisure time activities? (I am not referring here to third-world countries, of course.) These are both very important factors which probably account for most of the older people who are discovering model engineering, but they do not explain the increase of younger people who are becoming involved. Maybe, heavens forbid! it is simply because model engineering is becoming more visible, more fashionable or "sexy".

Certainly the public face of the hobby has become much more prominent in this country with such events as the Echuca rally, where several aspects of model engineering were on display, and exhibitions like the very impressive exhibition staged in Bendigo a few weeks ago. This has grown to a record size with a huge variety of displays and the general public, who came in their droves, were rapt. That's got to be a factor.

The strength of the hobby is evident with the increasing number of clubs, new miniature railways and suppliers to the hobby. From my point of view it is also evident from the steadily increasing sales of this magazine, worldwide. The question could be asked "Is the growth of *AME* a consequence of the growth of the hobby or is the magazine itself a cause of the growth of the hobby. As Editor, I would prefer to say "yes" to the former, but I really don't know — and I might be considered biased.

Incidentally, I often get asked how widely *AME* is read around the world and this is probably a good time to answer that question. Our largest market is Australia, naturally, followed by New Zealand, U.S., U.K., Canada, South Africa and most of the European countries. We also have small numbers of readers in Japan, Saudi Arabia, Singapore, Philippines, Vietnam, Argentina, PNG, Zimbabe and Hong Kong. There are probably others but without combing through the database I couldn't say for sure. Although our readership is global our emphasis continues to remain on model engineering 'down under'.

As I said at the start of this epistle, I believe the hobby is as strong as it ever has been. Maybe the reasons don't really matter that much — it may be that word has simply got around about what a terrific hobby model engineering is. After all, can you think of a better way to spend your leisure time?



*David*

**Managing Editor**
David Proctor
*Phone and Fax: (02) 6254 1641*
*(Leave message if unattended)*
*e-mail:* ame@netspeed.com.au

**Advertising Manager**
Brian Carter
*Phone: (02)4884 1205 Fax: (02)4884 1215*
*(Classified ads only to Managing Editor)*
*e-mail:* brian@ameng.com.au

**Contributing Editors** — *Brian Carter, John Cummings, Dave Harper, Clive Huggan, Gerardus Mol, David Wescombe-Down*

**Draughting** — *Dave Adams, Craig Belcher, Jim Gray, Peter Hall, Clive Harnwell, Rod Heslehurst, Peter Kerville, Peter Manning, Peter O'Loughlin, Tim Smith, Rex Swensen*

**Typing and Distribution** — *Phyl Oliver*

**Contributors** — *Warwick Allison, Des Burke, John Campbell, Dennis Collings, Peter Dawes, June Eastwood, Dave Giles, Peter Lukey, Henry Pattenden, Ken Preiss, Steve Reeves, John Romanes, Brian Wilson*

**Subscriptions** — *Mandy Proctor (02) 6254 1641*

**Back Issues and AME Retail** — *Phyl and John Oliver*
*PO Box 1403, Tuggeranong ACT 2900*
*Ph/Fax: (02) 6292 1938* *email:* jpoliver@webone.com.au

**AME Local Representatives**

***New Zealand*** — *Murray Lane (09) 534-8396*
***South Aust.*** — *John Wakefield (08) 8362 3269*
***Victoria*** — *Bill Taylor (03) 9458-3404*
***Queensland*** — *Dave Harper (07) 32611140*
***Tasmania*** — *Jim Gray (03) 6394 7124*
***Western Aust.*** — *Doug Baker (08) 93411630*
***NSW and ACT*** — *Contact the Managing Editor*

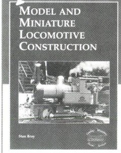
**All correspondence and articles (except AME Retail) to be posted to:**

**PO Box 21, Higgins ACT 2615 Australia**

NEW!

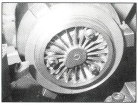
MODEL AND MINIATURE LOCOMOTIVE CONSTRUCTION

BY STAN BRAY

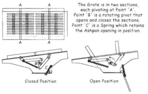


We are pleased to announce the publication of this new book by well known author and contributor to *Model Engineer* magazine, Stan Bray, on the construction of model and miniature locomotives from Gauge 1 to 7¼" gauge, with the accent on the passenger hauling gauges.

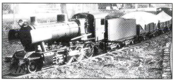
The bulk of the book is Stan passing on hints, tips, ideas and practices he has picked up over fifty years as a model engineer, and he covers the subject with chapters on each major part, such as frames, axleboxes, valve gear, cylinders, boiler, platework etc. He also covers electric and I.C. powered locomotives.



Each chapter is illustrated with drawings and photographs of the relevant parts of the locomotive, (the photographs covering boiler construction are in colour for extra clarity), and there are 7 pages of Appendices of useful charts. Throughout the book there are also photographs of model and miniature locomotives from around the world; this is the first ***International*** book on this subject, reflecting the Stan's pioneering of overseas visits, with models, from the early 1970s on, and his subsequent involvement with the rapid growth of the model engineering hobby in Europe and world wide.


A
A
A
A
B
C
The Grate is in two sections, each pivoting at Point 'A'. Point 'B' is a rotating pivot that opens and closes the sections. Point 'C' is a Spring which retains the Ashpan opening in position.
Closed Position
Open Position

Written in Stan's inimitable style, there are numerous asides, often humourous, so this book is a good read, as well as containing a huge amount of practical and useful information and ideas. Whilst especially useful for the beginner, this is a book any model or miniature locomotive builder should have on their bookshelves. Quality hardbound A4 format book. 208 pages with approximately 400 photos and drawings.



Only £33.80

*(Including Airsaver post to Australasia)*

CAMDEN MINIATURE STEAM SERVICES
VISA
Barrow Farm, Rode, Frome, Somerset.
BA11 6PS U-K
24 hour phone: 0011 441 373 830151
Fax: 0011 441 373 830516
Website: www.camdenmin.co.uk
MasterCard

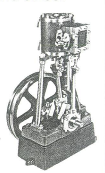
For your
MODEL ENGINEERING
requirements...

MATERIALS
Copper, brass, B.M.S., stainless, silver steel, in most shapes and sizes.

FASTENERS
Screws, nuts, rivets.

TAPS & DIES
BA, ME, Brass

FITTINGS
Injectors, gauges, valves, etc.



MACHINERY
A good range of pre-loved workshop equipment. New machinery also available.
A range of books and magazines are in stock.

EMCO MACHINE TOOLS
AUSTRALIA PTY LIMITED

VISA
2/247 Rawson Street
Auburn, NSW, 2144
Australia

Phone: (02) 9648 4377
Fax: (02) 9648 4150
ACN 002 506 139
MasterCard

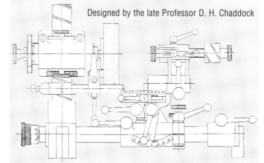
Hobby MECHANICS

More Details on our Website:
www.hobbymechanics.com.au
Suppliers of Machinery and Tools for Working in Metal and Wood

By agreement with Model Engineering Services, Sheffield, UK, we offer components to build the world-famous

QUORN
UNIVERSAL TOOL AND CUTTER GRINDER

Designed by the late Professor D. H. Chaddock

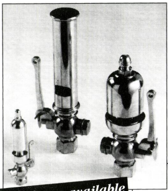


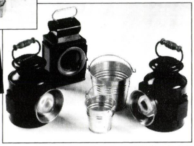
Perfect for the correct sharpening of milling cutters, lathe tools and drills, etc. We offer Australian-made castings combined with imported accessories. Both Mark I and Mark II styles offered. Please send S.A.E. for Details and Prices.

JOHN STRACHAN
HOBBY MECHANICS
P.O. BOX 785, KENMORE QLD 4069 • **Phone (07) 3374 2871**
• Fax (07) 3374 2959 • E-mail: jstrach@powerup.com.au

**LIVE STEAM MODELS**
**Fittings, Fasteners & Supplies**

Offering a comprehensive range of model engineering materials:-
- Valves
- Water & Pressure Gauges
- Displacement Lubricators
- Injectors
- Foster Lubricators
- Oilers & Grease Cups
- Whistles & Sirens
- Unions & Nipples
- Rivets, Screws, Bolts.





*Catalogue available with full range of model engineer's supplies and traction engines.*

Send $10 Australian Dollar bills (or Credit Card details ) to:

**Live Steam Models Ltd., Unit 7, Old Hall Mills,**
**Little Eaton, Derbyshire DE21 5DN England.**
**Tel: 44-1332-830811 Fax:44-1332-830050**
**E-mail:livesteammodels@zetnet.co.uk**
**Web Site: www.livesteammodels.com**

**M. B. M. MODEL ENGINEERING**
**IMPORTERS & SUPPLIERS OF MODEL ENGINEERING EQUIPMENT**

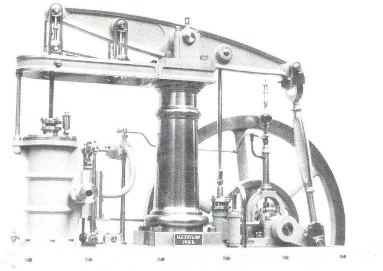
*Fittings, Nuts & Bolts, Taps & Dies*
*Write, Phone or Email for free Catalogue*

**STEAM OPERATED WATER PUMPS**

| Suitable for 5" gauge loco | Large 5in or small 7¼" gauge loco | Large 7¼" gauge loco |
|---|---|---|
| Bore 1 in | Bore 1in | Bore 1.375" |
| Stroke 0.875" | Stroke 1.25" | Stroke 1.875" |
| Water 0.625" | Water 0.625" | Water 0.750" |

Telephone 09-235-2018
Fax 09-235-7537
E-mail jaws38@xtra.co.nz
PO Box 75-153, Manurewa, Auckland, NZ
http:/www.MBMModelEngineering.com

**STUART MODELS**
**a Tradition**



**EMCO MACHINE TOOLS**
**AUSTRALIA PTY LIMITED**
®

Have our latest **Stuart Models** Catalogue mailed directly to you for only $15

2/247 Rawson Street,
Auburn, NSW, 2144,
Phone: (02) 9648 4377,
Fax: (02) 9648 4150
ACN 002 506 139

**We accept**
MasterCard VISA eftpos bankcard

• Stationary Engines • Marine Engines • Boilers • Steam Fittings • Fixings • Materials •

**MINI TECH** Engineering & Model Supplies

## Workshop Practice Series Books

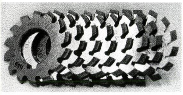
**An informative and educational series of books on an extensive range of topics, which are ideally suited to the beginner as well as the experienced machinist**

| | |
|---|---|
| WPS-01 | Hardening, Tempering and Heat Treatment |
| WPS-02 | Vertical Milling in the Home Workshop |
| WPS-03 | Screwcutting in the Lathe |
| WPS-04 | Foundrywork for the Amateur |
| WPS-05 | Milling Operations in the Lathe |
| WPS-06 | Measuring and Marking Metals |
| WPS-07 | The Art of Welding |
| WPS-08 | Sheet Metal Work |
| WPS-09 | Soldering and Brazing |
| WPS-10 | Saws and Sawing |
| WPS-11 | Electroplating |
| WPS-12 | Drills, Taps and Dies |
| WPS-13 | Workshop Drawings |
| WPS-14 | Making Small Workshop Tools |
| WPS-15 | Workholding in the Lathe |
| WPS-16 | Electric Motors |
| WPS-17 | Gears and Gear Cutting |
| WPS-18 | Basic Benchwork |
| WPS-19 | Spring Design and Manufacture |
| WPS-20 | Metalwork and Machining Hints and Tips |
| WPS-21 | Adhesives and Sealants |
| WPS-22 | Workshop Electrics |
| WPS-23 | Workshop Construction |
| WPS-24 | Electric Motors in the Home Workshop |
| WPS-25 | The Backyard Foundry |
| WPS-26 | Home Workshop Hints and Tips |
| WPS-27 | Spindles |
| WPS-28 | Simple Workshop Devices |
| WPS-29 | CAD for Model Engineers |
| WPS-30 | Workshop Materials |
| WPS-31 | Useful Workshop Tools |
| WPS-32 | Unimat 3 Lathe Accessories |
| WPS-33 | Making Clocks |

**All Titles $21.45 Each**

**Special : Buy any three or more of these titles and receive the freight free.**

## MODULE GEAR CUTTERS



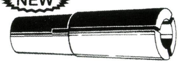
**Module Sizes available .3, .5, .6, .7, 1.0, 1.25,1.5,1.75,2.0**

**Arriving soon Module .8**

**8 Cutters per set**
from $236.50 per set

NEW

## 3MT Collet Set



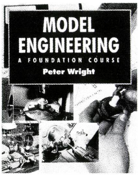
**7 piece collet set, 4,6,8,10,12,14,16mm**
***MVS0940-6*** **$110.00**

## Precision Collet Chuck Set – Size ER16

Range 0.5 to 10mm
Ideal for holding small work or cutters in a Lathe or in a Mill.
Set includes 10 Collets & Holder

| | | |
|---|---|---|
| **V-412** | **2MT** | **$375** |
| **V-419** | **3MT** | **$395** |

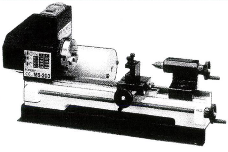
## Model Engineering—A Foundation Course



A recent book by an experienced model engineer covering all the basic techniques of lathes & milling machines, plus understanding engineering drawings, buying materials and marking out, sawing, filing, bending and forming metals. Includes a review of engineering, materials and the making of cutting tools in the home workshop for practical people who have little experience of working in metal.
Normally $43.45 **Special—$39.95**

NEW Edwyn Jones' Latest Creation! **Hot Air Model Traction Engine Kit** which comes complete with pre-cut gears. **Kit only $299.00** P/N: HAE-T

## MICRO BENCH LATHE MJ189A



**OUR NEW LOW PRICE OF $595.00**

The MJ189A is ideal for small machining by model makers, clock makers and anyone who requires an accurate result..
Fitted with 2 speed, 95/65w electric motor, This is a quality product which is manufactured in Taiwan. Many accessories available, which can also be used on Emco unimat 3 and 4.

**Technical Data:**

| | | | |
|---|---|---|---|
| 8 Speeds | 130-4000RPM | Swing diameter over bed | 96mm |
| Chuck Capacity | 50mm | Swing diameter over tool carrier | 66mm |
| Distance between centres | 200mm | Size of Lathe | 450L x 250W x 190H |

**Complete with:** Motor, 3 Jaw chuck, Tail Stock Centre & Tool holder

6/16 Kenworth Place, BRENDALE Qld 4500. Ph 07 3889 7689 Fax 07 3889 6877
**Web: www.minitech.com.au email: sales@minitech.com.au Catalogues Available $5 posted**

# Adjustable Workstand for the Bandsaw

### By Peter Dawes

*Drawings for publication from the author's originals by Dave Adams*

## Summary

I am sure that readers will remember making temporary work supports for their bandsaw using blocks of wood, boxes and bits of metal and whatever. I am also sure they will have cursed while trying to get the height right – only to see it fall over when the bar is moved.

Therefore this stand is dedicated to those who use that ubiquitous but very useful Taiwanese bandsaw sometimes known as the RF115 or the BS-5 but called by other names when the blade keeps coming off. The stand will adjust to the bed height of 23.5 inches or to the table height of 33.5 inches and can be modified to extend to a metre or more to suit a floor standing drill press, lathe or saw bench.

It stands free on the floor so that it can be used on either side of the saw. It can be made in just a day if you have the parts and if you have an abrasive cutoff saw, an angle grinder, a welder, and of course, a lathe.

The whole idea depends on the fact that some sizes of square hollow section tubing (SHS) are designed to slide inside each other with a clearance that depends on the wall thickness of the outer piece. The project would not have been feasible otherwise. I made mine with one telescoping extension, adjustable in coarse steps of 1 inch, and with fine adjustment by means of a 1/2 inch Whitworth screw about 4" long (100). UNC can be substituted for Whitworth but not UNF.

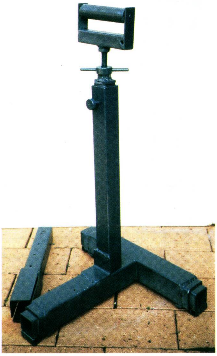
While round pipe could be used, telescoping sizes are not so common and each extension would have to be firmly locked against rotation or the stand would be a failure.

## Specifications

- Minimum height 23 inches (585mm).
- Maximum height approximately 36 inches (900).
- Base – Tee-shaped, 10" x 11" approx (250 x 280).
- Top Roller – 1 inch (25) diameter by 5 inches long (125).
- Height adjustment: Coarse, in steps of one inch by inserting a pin into holes spaced in the tubular column. Fine adjustment is by a 12 tpi screw in half turn increments of 1/24 (.042") inch (about 1mm).
- Cost – less than ten dollars using scrap offcuts from a steel supplier's bin.
- Construction Time: – Excluding modifications, one day when all component bits and pieces are to hand.

## Discussion

Commercially made stands usually depend on a friction clamp to lock them and to provide the necessary infinite resolution. This is not always reliable and if it collapses during a cut, you can say goodbye to the blade. The friction type is simple to make but none that I have seen can go low enough to suit the BS5 bandsaw, and they cannot be tucked away under the saw on account of their tripod legs.



*The completed stand. The loose piece on the floor is an extension tube which allows it to extend to over a metre*

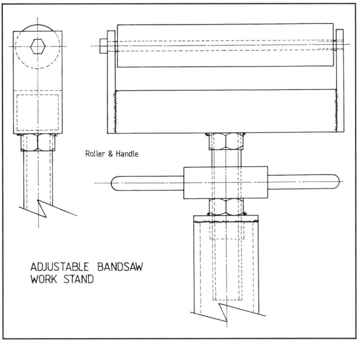
It would not be a financial proposition to make this stand if you had to buy 6m lengths of all the sizes just to obtain a few short pieces of SHS, so it is made from scraps from a local steel supplier's waste bin. He gets only 4 cents per kg at the scrap metal dealer, and that is hardly worth the effort of carting the bin there. Or if he takes it to the council tip he actually has to pay them to take it! So metal merchants should not object to you having a scrounge in their bins. You will probably not find all the pieces at once, but over time, you should be able to accumulate what you need. Another source is the local scrap metal dealer who will charge you a dollar a kilogram for something he pays cents for. Another source is the local recycling shop at the garbage tip. You will pay there too but the range happens to be very limited in our tip.

The only bought components were the 5 x 1/4"W hex bolt in the roller, and the paint. However if a long screw is used to make the taller two stage telescopic stand, this will have to be purchased at the local hardware store where it costs about $5 per metre (1A$ currently = US66 cents).

Certain metric square tubes are designed to be sliding fits in each other so that if you use 32 inside 38 x 2.5 or 3mm you get a good free fit depending on the gauge. These are imperial equivalents. For heavier work use the 40mm size sliding in heavy wall 50mm tube. Unfortunately, the 38 is not a good fit in 50mm so making a two stage telescopic stand is not quite so simple unless you use the long screw method as the second stage.

The fine adjustment is by means of a 4 inch Whitworth bolt 1/2" x 12 tpi, or for a heavier or taller stand use 5/8" x 11 tpi W or 3/4" x 10 tpi W threaded rod (or NC). Whichever is used, run the rod in two nuts welded together to give it greater stability.

If used to support thin rod in the lathe, users will have to make some sort of ring to hold the rod captive when it turns. For very long rods a tubular extension is preferable, consisting of a tube with ball race at each end and this would need two stands to support it. That is something for another time.



## Base

The base is made from two lengths of light gauge 50mm square tube welded to form a "tee". A tee is more compact than a "cross" and when not in use slides under the bandsaw without taking up floor space. The feet under the tee are made from small pieces of 6mm flat welded underneath at the ends to give stability when the floor is uneven.

## Column

My telescopic column is made from 38 and 32 mm SHS tubing only because those were the main sizes I happened to have.

Drill a $\frac{1}{4}$" hole right through the centre of the larger (38mm) tube one inch from what will be the top end, for the locking pin. Mark the smaller piece (32mm) at approximately one inch intervals along one face of its length. Put the smaller tube inside the larger tube flush at the top end.

Now, using the hole in the 38mm tube as a drill guide, drill right through both sides. Now slide the inner tube out to the next mark and drill right through again. Continue for all the holes. This guarantees that all the holes are aligned and no accurate marking out is required.

The pin to lock the inner in the outer tube is a piece of 6mm rod. Weld a knob on one end and turn the other end to a blunt point.

The two nuts for the screw are first welded one on each side of a square piece of flat with a half-inch hole in the centre. Put the bolt or threaded rod through the assembly and tighten the two nuts up finger tight. Weld each nut to the flat. Remove the screw. Run the $\frac{1}{2}$" tap right through to clean the thread. Screw the bolt back into the nuts and weld the flat onto the top end of the inner SHS tube making sure that the bolt stays exactly in line with the tube.

## Roller and T-handle

The T-handle is made from a piece of 25 mm SHS about 125mm long. Square the ends carefully. Two flats of 25 x 3mm x 70mm long are now required. Drill both centrally 16mm from one end for the quarter inch bolt, 5.1mm or #8. Tap one of the pieces $\frac{1}{4}$"W, and open the other one out to 6.5mm for clearance. Weld the flats onto the ends of the 25mm SHS tube as shown in the diagram to make a U-shaped support for the roller.

Finally, weld the head of the $\frac{1}{2}$" bolt, or the screw with a nut on it, onto the centre of the bottom face of this handle, again making sure it is square.

The roller proper, which also functions as a handle for lifting the stand, is a piece of $\frac{3}{4}$" galvanized water pipe just long enough to fit between the ends of the T- handle. The ends of the pipe are plugged and drilled centrally in the lathe 6.5mm for clearance on the six inch bolt. It should be concentric and rotate freely. If working with very heavy bars use 1 inch water pipe with a $\frac{5}{16}$" or $\frac{3}{8}$" bolt as the axle.

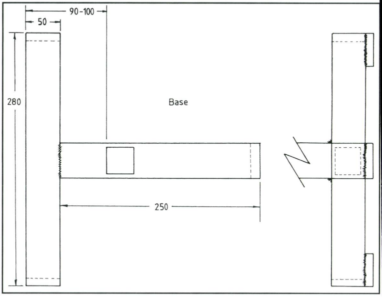
## Capstan locknut

The last part is the capstan locknut. This is important because without a lock on the fine adjustment screw, there is a strong tendency for the roller to swivel round, preventing the work piece rolling properly, and that results in the stand being pulled over. Chuck a short piece of 32 or 38mm round bar and drill it axially 10.5mm (for $\frac{1}{2}$"W screw, or 16.5mm for the $\frac{3}{4}$"W screw) to a depth of about 16mm. Part it off about 13mm long. Chamfer the edges. Tap the hole $\frac{1}{2}$"W (or to suit the screw).

Drill a crosshole in the locknut so-formed, 6mm or $\frac{1}{4}$", on a diameter. Make two capstan arms of 6mm (or $\frac{1}{4}$" round) about 32mm long. Round their outer ends and Loctite® them into the crossholes staying just clear of the tapped hole inside. Or if preferred, for a slightly better job thread the ends of the rods 6M or $\frac{1}{4}$"W and tap the holes in the capstan nut appropriately.

## Assembly

Smooth any rough welds with the angle grinder and coat any non-galvanised steel with Ferropro®. Assembly is straightforward. Paint with primer and an enamel of your choice. The best way is to use spray cans of quick drying enamel obtainable from Crazy Prices or Price Busters discount stores for about $3.



## Usage

First set the coarse height adjustment by selecting the most appropriate pin hole for the height. Loosen the capstan nut and screw the handle up or down for fine adjustment. Lock the capstan firmly. The screw can be adjusted in half turns without moving the base on the floor so that a half inch Whitworth screw with a pitch of 12 tpi gives fine height adjustment in increments of $\frac{1}{24}$" per half turn (about 1mm). The 10 tpi of $\frac{3}{4}$"W gives $\frac{1}{20}$" increments per half turn. This should be more than adequate but if you want better than this, rotate the whole stand a quarter turn on the floor to halve those minimum increments.

The stand is quite light and for most work, does not need great lateral stability. You should not want to drag the work across the top of the stand and in any case heavy bars will roll easily on the roller provided it is aligned correctly. If more stability is needed, put some heavy weights on the feet or into the hollows of the SHS.

If builders want to eliminate some of the lateral play in the stand due to the clearance in the telescoping tubes, run a weld bead at a lowish current setting around the outside of the BOTTOM end of the INNER tube. Leave a short gap in the bead where it will be opposite the weld seam on one of the inside faces in the outer tube. Then file or grind the bead back to give the clearance for the required sliding fit. The top is not affected so this doesn't eliminate all side-play but the presence of the pin helps there. Side-play is not very important. It is having an unyielding vertical adjustment that counts.

While the base could be made wider for more stability, it could then become inconveniently large and get in the way in a small workshop. So a modification that makes the best of both worlds is to make the footprint of the base adjustable in the same way that the height is adjustable. That is by fitting telescoping leg extensions.

## Optional modifications

### 1. Adjustable base width

The base of the stand can be made expandable by sliding 40mm square tubes into the 50mm base tubes. In this case the 50mm tube should be chosen to be thick-walled (4mm) to give a closer fit. The inner extension tube can be made equal to the length of the outer tube plus half an inch or so required for a foot outside to lift it slightly, so if we decide that for stability, 3 inches is to always remain inside the outer tube, the base can be extended by 4 or 5 inches on each side arm of the TEE and by about 7 inches on the vertical leg of the TEE. That is a significant increase and not difficult to add. Most of the time you do not need the extension.

### 2. Increased height

The floor model drill press is another place where the stand can be useful. I have had some awkward long jobs where I have had to get assistance to support the workpiece on the table. This stand would have solved most of those problems. The tip of a quarter inch drill in the chuck of my drill with the quill at the bottom of its travel is 44 inches above the floor (nearly 1200mm). Note that it is not the drill TABLE that matters as much as where the drill tip is located. That point is more or less fixed whereas the table is not. So the stand must be able to extend to about 44" for this application.

The centre line of the lathe is at much the same height so a stand that reaches to 44 inches or 1200mm would be a useful accessory for that too. In this case the column should be made of 40mm SHS sliding in thick-walled 50mm SHS and the fine adjustment screw should be $^5/_8$" or $^3/_4$". The base should then be about 16" x 16" or more, and perhaps weighted. Also note the comments above about converting the roller into a tube when used with the lathe.

My bench saw table is 38$^1/_4$" above the floor and the mill/drill table is 40$^1/_4$" so the same higher stand could be used with those as well.

The stand would also be useful with a power hacksaw. I do not have one but I suspect that its vise height might be less than 23 inches. So if making a stand to work with that machine or any other with a lower minimum height, the builder will have to modify the length of the telescoping tubes. That of course will affect the maximum height.

If the height is increased then the base should also be extended.

## Extending the height

There are three methods to increase the maximum height without sacrificing the essential minimum of 23 inches although it cannot be done in just one telescoping section.

**A.** Use a long screw to create the second telescopic section as already mentioned. This is neat but adjustments of 6 inches or more would require 70 turns or more and that would be very tedious.

**B.** Use a second set of telescoping tubes. These are not so easy to find but you can pack two sides of the 38mm SHS to make it fit inside a 50mm tube. I will not go into details here because it depends entirely on what gauge 50mm tube you happen to start with. You could glue/screw/tack-weld flats of suitable thickness to two or four sides of the inner tube to get the required fit, but always allow a good millimetre of final clearance.

**C.** Make a fixed extension piece to insert in the middle between the lower tube and the upper tube. This requires about 4-6 inches (100-150mm) of SHS to make a socket that fits OUTSIDE the lower section (which was presumably 38mm SHS). Into one end of this is welded about 12 inches (300mm) of the same 38mm so that it corresponds with the original outer tube. Drill a ¼" hole in the top of this 38mm extension corresponding to the hole in the top of that lower outer tube. The extension length required is the difference between the maximum required height, and the maximum as it is now, namely 44 minus 36 or 8 inches. This also becomes the distance between the two $^1/_4$" holes. Alternatively, to make the socket, weld two short lengths (about 5" long (125mm) of angle onto opposite corners on the end of about 10" of the same 38mm tube. With 1.5" of angle overlapping, a length of 3.5" forms the socket proper. A piece of shim under one the pieces of angle before welding may be needed to prevent the socket from ending up too tight.

*Another view of the completed stand, this time from the opposite side*

To use the extension, just remove the pin and lift out the upper assembly. Drop the extension tube over the bottom section. It is stopped by the end of the piece of 38mm inside so that it does not require a pin. Drop the 32mm screw/handle/roller assembly into the extension and use the pin for making coarse adjustments as was done previously. All the extension does is to raise the whole adjustment range by some fixed extra distance of about 6, 7, 8, 9 or 10 inches (50-250mm) as desired. This is much easier and quicker to make and use than the other options and the way I eventually did it. However, if I had thought it all up at the beginning I would have used 40 and 50mm SHS tubing for the main column of the stand instead of 32 and 38mm, even though that would also have required a short piece of 2.5" (~60-65mm) SHS. The problem is that when I started I was only thinking of the bandsaw.

The following sizes each will make two telescopic sections and I have found off-cuts of all of them at one place or another:

A. 50 x 4mm, 40 x 2mm, 35 by 2.5mm.

B. 30 x 1.6mm, 25 x 2mm, 20 x 1.5mm. Incidentally, J Blackwood & Son Ltd have published a list of all the possible telescoping sizes.

## PARTS LIST

(Does not include all the modifications; Remember that 40mm telescopes inside thick-walled 50mm and 32mm inside 38 x 2.5mm SHS).

- Two pieces of 50mm SHS any gauge 300mm and 250mm long — but use thick-walled if you want to add the extendable legs; (base).
- One piece 38mm square 400mm long; OR: 50 x 3mm or 4mm wall, SHS (outer column).
- One piece 32mm square 400mm long; OR: 40 x any gauge SHS (inner column).
- One piece 25mm SHS 125mm long; (T-handle that carries the roller)
- One piece $^3/_4$" galv. water pipe 120mm; (roller; use 1" pipe for heavy work)
- Short scraps of BMS to make plugs for the roller.
- One 6 x $^1/_4$ inch hex bolt; (handle 'axle' or $^5/_{16}$" or $^3/_8$" for heavy work)
- One 4 inch long (approx) by half inch Whitworth bolt or setscrew threaded full length; (fine adjustment screw). Substitute any other threaded rod of appropriate diameter and length for the larger modified version, but not NF — the pitch is too fine!
- Two $^1/_2$"W nuts (or to suit the screw).
- 100mm approx of 6mm or $^1/_4$" b.m.s. (capstan nut arms)
- Short piece of 32 or 38mm b.m.s. round; (capstan nut body).
- 150 mm approx of 25 x 3 flat; (end pieces for T-handle).
- Short scraps of 6mm flat bar for the feet under the base.
- Abrasive discs, 2.5mm welding rods, Ferropro, paint.

## Conclusion

This little stand will soon become indispensable around the workshop. In fact there is a case for making two of them – one for each side of the saw. It's easy to move around, parks conveniently under the side of the bandsaw, can be set precisely and doesn't sag so much as a whisker. It may wobble slightly sideways and back or forwards at the top due to the clearance in the tubes but that is not necessarily a fault. What matters is that the height is completely stable and it doesn't collapse or fall over at some crucial moment. It's always there when it's wanted and doesn't lose concentration unlike that other assistant referred to above.

# 40th Echuca Steam, Horse & Vintage Rally

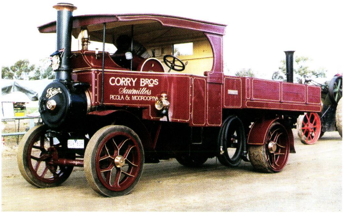
### by David Proctor

This was the first time I had attended the big annual rally in Echuca, and being a milestone event, it promised to be a good one. About 40k out from Echuca I ran into a fairly substantial dust storm with a bit of rain thrown in and extremely strong winds blowing. As the wipers struggled with the mud on the windscreen I was wondering just what sort of weekend I was in for.

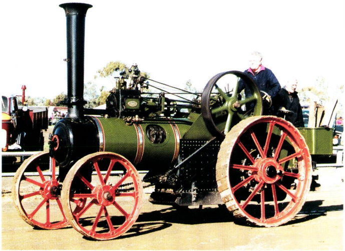
However, there was no need to worry — the locals had it all under control! Saturday morning dawned cold, calm and clear. It was obvious there there was a lot to see and photograph so an early start was in order. There were many traction engines, rollers, portable engines, static engine displays and a huge number of tractors and cars of all ages from the very old to the fairly modern. Several heavy horses were to be seen working over the weekend and three miniature traction engines were in steam. The photos show a small sample of what was on view. To show everything would take far more pages than we have available.

Sunday was another great day, passed in much the same way with one exception which was the highlight of my weekend. Steamrail operated a steam-hauled tour from Melbourne to Echuca for the day and Dave Mickle, the owner of a Yorkshire steam wagon decided to drive the two or three kilometres to Echuca station to photograph the wagon together with the R class locomotive. His fireman, Robert Jones, asked me if I would like to come along for the ride. Does a duck like water!

All too soon the weekend was over. I know I will be a more regular visitor to Echuca on Queens Birthday weekend.

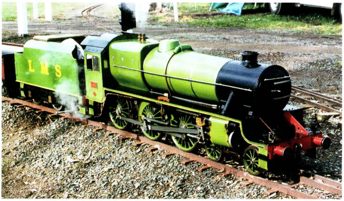


*A very nicely restored Foden wagon with full road registration*

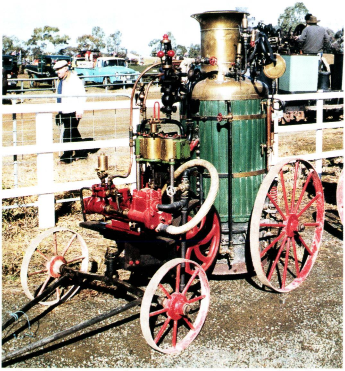


*This Clayton and Shuttleworth steam tractor was nicely turned out*

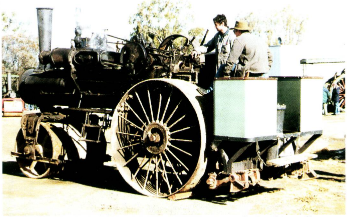
*Heavy horses, teams and individuals, were busy in the field both days*



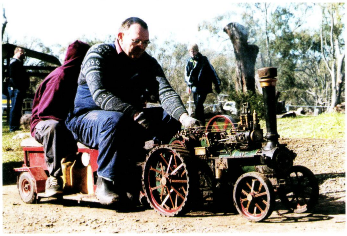
*Ross Walker's 7.25" LMS 4-6-0 was one of several locos which worked hard all weekend moving several thousand passengers*



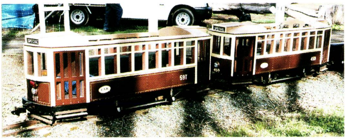
*Gem 6HP pump manufactured by Deutscher & Sons of Hamilton, Victoria in 1909 and restored and exhibited by Howard Mountjoy*



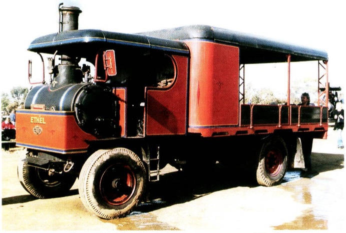
*Were Case steam rollers very common in Australia? This well worn example was the first seen by the author.*



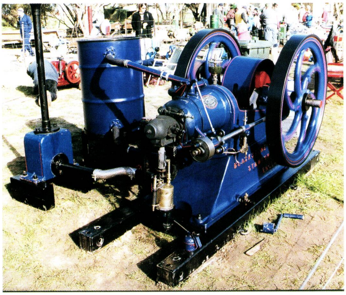
*Anthony Bucknell takes his 3" Burrell for a run around the miniature railway. Anthony's Burrell was one of three miniatures in attendance for the weekend, the other two being Peter Smith from Newcastle with his 4.5" Allchin and John Oliver with his 2.5" engine from Canberra.*



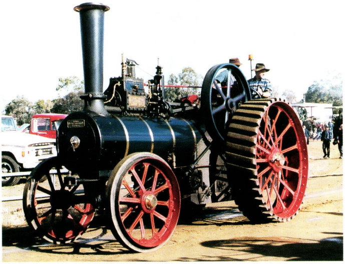
*Another consistant performer on the Campaspe Valley Railway was this coupled set of 4-wheel trams, the driver sitting in the lead car and passengers in the rear one. The gong sounded like the real thing.*



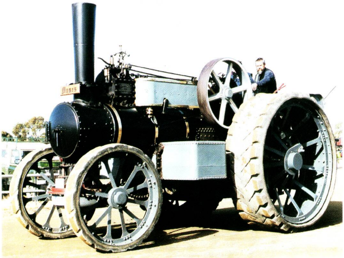
*Dave Mickle's Yorkshire steam wagon* Ethel



*One of the more prominent exhibits in the Oil and Petrol Engine display was Robert Meyer's 6hp Blackstone Oil Engine. Made in Stamford, England in 1910 it was used by the Mines Department of Victoria to power a crushing plant at a state owned battery.*



*This single cylinder Foden is a well finished engine and a credit to its owner/restorer, right down to the rubber "strakes" on the hind wheels.*



*Trevor Hazelman's Fowler 8nhp single cylinder* Moses *was easily the largest engine at the rally. Built in 1920, it was one of six imported for construction of the Mulwala Irrigation System. Later it was used for desnagging the Murray River to keep it clear for paddle steamers and for clearing land for agriculture.*

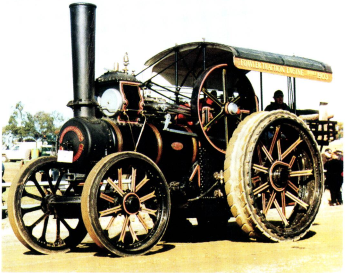
*1934 Ford V8 truck owned by Frank Tamis of Durham Lead, Vic*

*The Foden single was popular in this country – note the 'Oz' canopy*

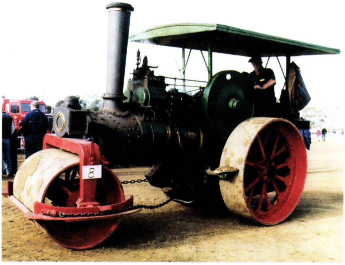
*1916 T Model Ford owned by G & W Stockdale, restored by K Clyne*

*Many cameras clicked as Dave Mickle's Yorkshire steam wagon met Steamrail's R761 at the Echuca turntable.* Photo: Kim Jones

*The Super Sentinel wagon was one of the last steam wagons to disappear from the road. This is a fine example.*



*Built in 1903, Fowler 7nhp compound engine (No. 9873) spent its working life around the Wellington area in central western NSW performing threshing and general haulage work for a contractor. It is now owned by Jarrod Beer of Wharparilla.*



*Noel Smithwick from Romsey at the wheel of Gisborne Vintage Machinery Society's Fowler DNA roller, ex Essendon City Council.*

# A Small Weir Type Stationary Boiler Feed Pump, circa 1885 — part 2

### by Peter Lukey

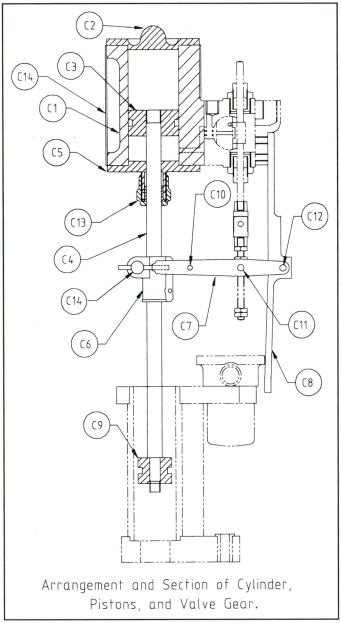
*Drawings for publication from author's originals by Peter Manning, photos by Brian Carter unless credited otherwise*

The **steam cylinder** consists of a bronze "cotton reel", a brass port block and covers. The outside profile of the cylinder is turned to size but is left over length to allow for final machining, likewise the bore is left undersized. The lower flange has a rectangular notch milled out to a depth just touching the cylinder outer wall. At the same depth, mill out the radius below the upper flange so the port block will sit flat for silver brazing.

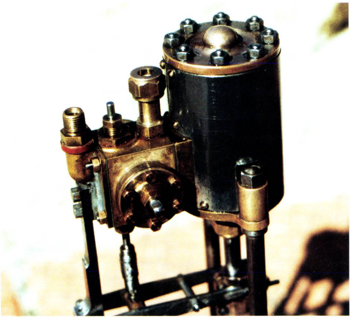
The port block is milled out of hard brass. If milling $^{1}/_{16}$" wide slots is a bit daunting, there is not much room for error or cutter deflection here, drill a row of $^{1}/_{16}$" diameter holes and join them up with a tiny cross cut chisel.

Silver braze the port block to the cylinder with a generous fillet along the sides of the port block.

If the passageway to the top of the cylinder is proud of the cylinder flange, set the cylinder in the 4-jaw chuck and skim down flush. Bore the cylinder lower end outwards and face this end to size at the same setting.



Arrangement and Section of Cylinder, Pistons, and Valve Gear.

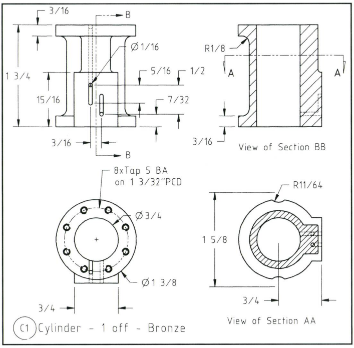


Reverse the cylinder onto a stub mandrel and face the top flange to length. Lap or hone the bore for a fine surface when all machining is completed. Drill the passageways and lightly face the surface for the steam chest mounting.

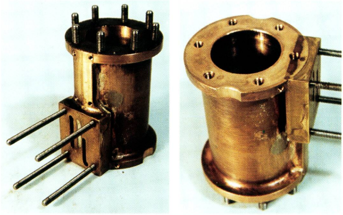
The lower cover is fabricated in two steps. A piece of $^{3}/_{16}$" thick brass is cut out and filed to the outline on the drawing. Use drawn bronze for the gland stub. This is turned with a $^{5}/_{16}$" diameter x $^{3}/_{4}$" spigot. Do not thread or drill yet.

Silver braze the gland stub into the cover plate and clean up.

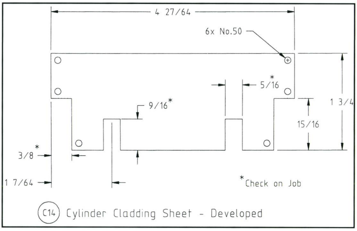
Hold the cover by the protruding $^{5}/_{16}$" diameter stub, face the



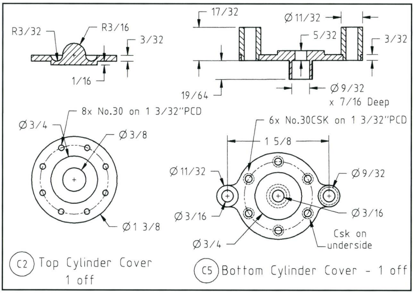
C1 Cylinder - 1 off - Bronze



*Views of both ends of the cylinder with port block and studs fitted*

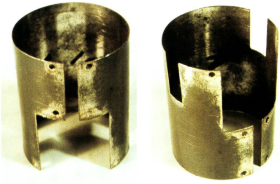


Cylinder Cladding Sheet - Developed

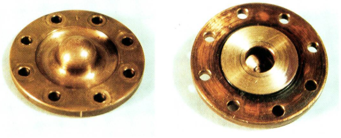


Top Cylinder Cover 1 off

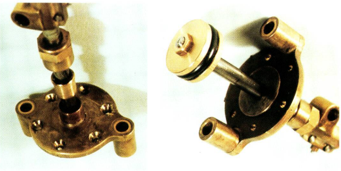
Bottom Cylinder Cover - 1 off



*The cylinder cladding sheet rolled ready for fitting*



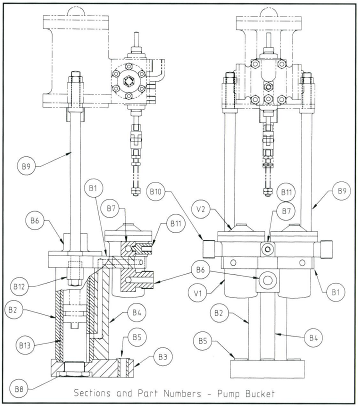
*Above: Top cylinder cover. Below: bottom cylinder cover with piston*



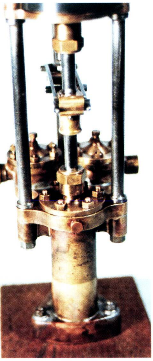
cover just to clean up and machine the gland thread. Finally drill and preferably bore finish for the piston rod and packing bush. Fit the cover to an accurate tapped bush and check that the piston rod bore runs true. Face the cover to correct thickness forming the cylinder spigot to a 'snap' fit in the cylinder. Make up the two tie rod bushes and sweat these in with 965 alloy solder. Fit the lower cover to the cylinder with countersunk screws ensuring the centreline of the tie rod bushes is parallel to the port block face. These screws will be filled in before painting to represent an integral bottom cover as in the full size pump.

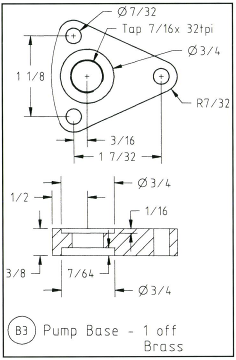
The top cover is made from hard brass. The outside profile is typical of the Weir pumps. The stud fixing holes are set at split centres to clear the upper steam passage.

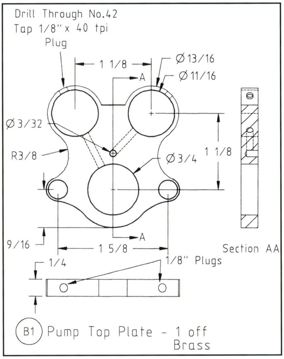
Retrieve the steam chest assembly and use it to mark through

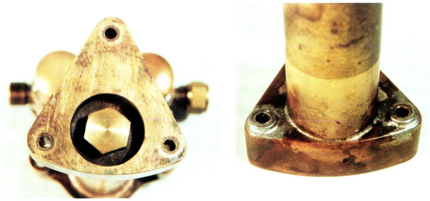


Sections and Part Numbers - Pump Bucket

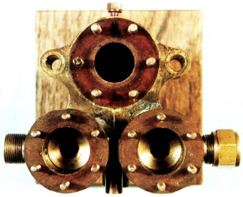




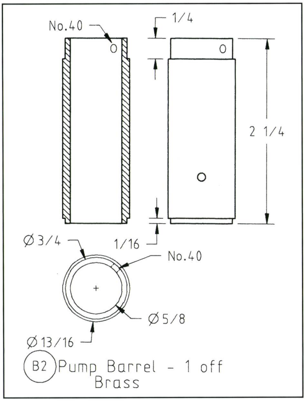


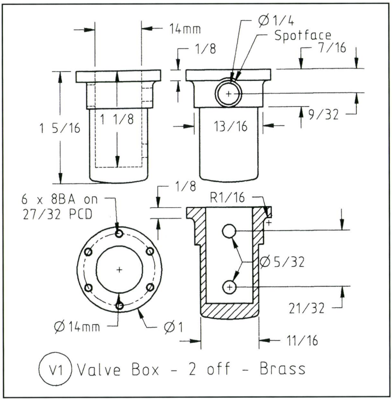


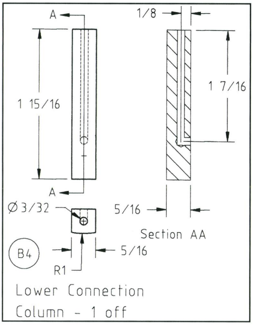
*Two views of pump base (taken after assembly)*



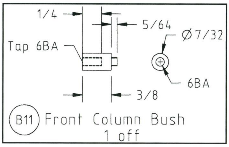
*Pump top plate with components fitted*



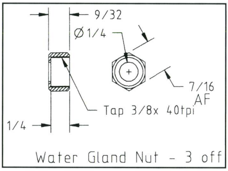




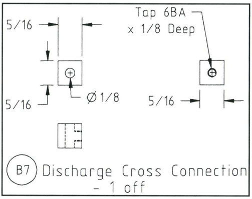
B4 Lower Connection Column - 1 off



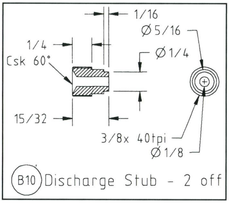
B11 Front Column Bush 1 off



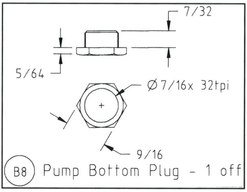
Water Gland Nut - 3 off



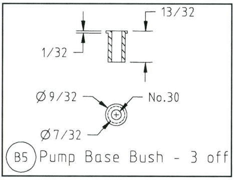
B7 Discharge Cross Connection - 1 off



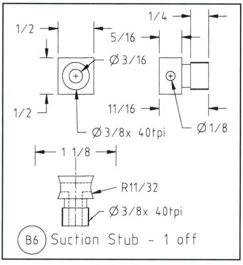
B10 Discharge Stub - 2 off



B8 Pump Bottom Plug - 1 off



B5 Pump Base Bush - 3 off



B6 Suction Stub - 1 off

for the mounting studs. Make sure no chips get into the valve chest. Drill and tap the stud holes in the cylinder.

Finally make a tinplate or blued steel cylinder cleading and fit this with 10BA round head screws.

**The pump body** is a bit of a jigsaw puzzle, being a fabrication of 8 parts. Start by making the pump cylinder top flange. Mark out a piece of 1/4" thick hard brass, checking the pump bore and tie rod centres against the bottom steam cylinder cover. A jig plate could be used here, marking this out through the bottom steam cover and transferring the holes to the pump top flange.

Machine and file the base of the pump from hard brass.

Turn up the pump barrel from hard brass rod or suitable tube. This can be brass as it is fitted with a liner.

Machine the valve bodies from hard brass. The bore is actually 14mm diameter as the valve seats are sealed with 14mm x 1mm section 'O' rings. Check carefully when drilling the cross holes for the correct positions, using the pump top flange as a guide. Countersink the cross holes to prevent blockage.

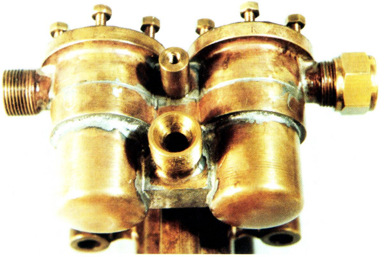
The pump barrel, pump base, pump top plate, tie rod bushes, lower connection column, and the tie rod bush webs are all silver brazed in one heating; using various clamps, wire and bricks to hold the parts in place. The discharge union nipples are silver brazed into the valve bodies also.

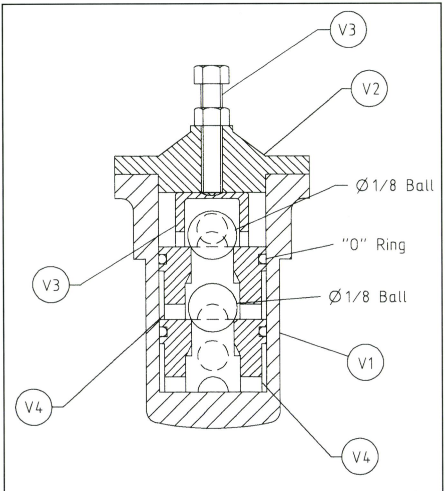
The pump body assembly can now be set up on a screwed spigot in the base plug hole and a light skim can be taken across the top face; just enough to clean up.

Finish bore the pump body to suit the liner tube.

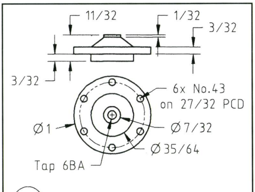
I used a piece of hard drawn yellow brass tube for the liner, otherwise the liner can be machined from bronze rod. Whichever is used lightly lap the bore.

After machining the pump body, fit the valve bodies, the cross port block and the suction union nipple. Sweat these parts together with 965 alloy

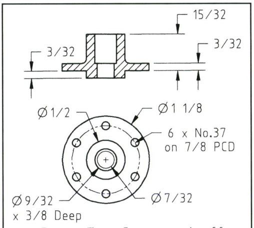




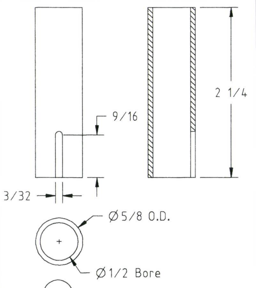
Arrangement of Suction & Delivery Valves



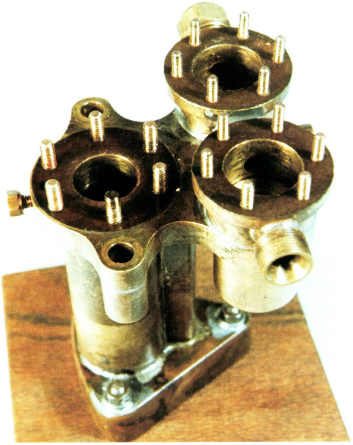
V2 Valve Box Cover - 2 off



Pump Top Cover - 1 off



B13 Pump End Liner
1 off - Brass



solder. Sweat in the base bolting down bushes.

Clean up the pump body and check all passages are clear.

Temporarily fit the pump liner and drill and tap the body and liner for the securing bolt through the top plate.

Machine the pump and valve top covers from hard brass. The top pump cover could be all bronze or fabricated like the steam cylinder bottom cover. Use the covers to spot through into the faces on the pump body. Drill and tap the pump body faces for the holding studs.

*To be continued ...*

# Steam Chest

### with Dave Harper

Hi there, steam fans, and welcome to another load of ebullition from the steam chest. I have some great stuff to share with you as usual, including lots of feedback on the 'mystery pump', a further update on *Red Fred*, and some great new models from our readers.

## Pumps aplenty!

The pump shown in photos 5 and 6, issue 108, May/June 2003, p18, sent in by Allan McGrice, generated quite a lot of feedback — apparently this style of pump was pretty common in the heydays of steam, and was produced by several manufacturers.

Gil Macfarlane sent me some copies from an old ICS textbook. There it is called the Adamson Boiler Feed-pump and came with a good illustration, see **figure 1**. The description goes on ... "is of the vertical outside-ram or plunger type, is very largely used for boiler feeding against high or low pressures .... the steam is used expansively in the cylinders **a** ... the columns **i**, bolted to the soleplate **j** and supporting the steam cylinders, are hollow and serve as air chambers for the pump. The suction and delivery pipes are shown at **k** and **l** with the flange **m**, to which the piping for delivering water to the boiler is connected."

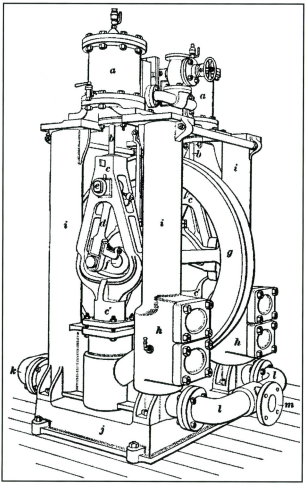


Figure 1

David Mottram sent another neat diagram from a booklet published by the Northern Mill Engine Society in the UK. It shows a compound version of the pump which it says are called either Pearn or Cameron pumps. It says standard sizes ranged up to 65,000 gallons per hour capacity on low lift, but an outsize one for a colliery weighed 27 tons! It had to be dismantled to send it into the pit, but with its 18" dia rams it superseded a surface beam pump.

David also included a photocopy of pictures of a pair of similar pumps in the Hove Engineerium, in the UK.

Next, Rohan Lamb sent me copies from a 1900 catalogue of Frank Pearn and Co. Ltd, of Manchester, England. This catalogue apparently has 200 pages of different pumps.

Here it's called Pearn's Cameron pump! The diagram looks pretty much identical with Figure 1, and the catalogue lists sizes from 2" ram dia, having steam cylinders of 4" bore x 3" stroke feeding 520 GPH at 130 RPM up to a monster with 15" rams, 18" x 15" steam cylinders pumping 40,000 GPH at 35 RPM!

Finally, old friend John Single sent a drawing which came as part of an ad for CD players, in a 1990 newspaper, showing music emanating from the outlet of one of these pumps! John was so intrigued by this that he contacted the newspaper concerned and found that the reporter used the drawing from a book of what we'd now call clipart, and he had no idea what it represented. I guess to have been used on a standard sheet of illustrations, it must have been a very common item in

Photo 1

Photo 2

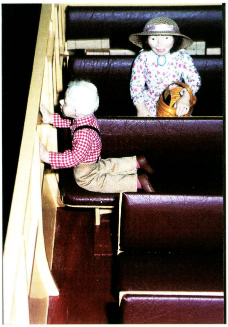


Photo 3

its day.

Thanks, all of you, for your interest — it goes to show how a very common item from one age becomes a mystery years down the track!

## A crew for *Red Fred*!

I received a welcome note from Alan Houston recently telling me that he's finally got some figures to set off his super-detailed model of the QR diesel railmotor *Red Fred*. (See *Update on Red Fred*, issue 108, May/June 2003, p48). As commercial figures at 1/8 scale seem to be unobtainable, Alan commissioned a local lady to make some for him. Photos 1-4 show how Alan has set the figures up — the driver just visible in **photo 1**, doing his job in **photo 2**, the passengers in **photo 3** and the lad looking out of the window in **photo 4** really looks authentic — thanks, and well done, Alan!

## Another mystery engine in WA

After finally managing to fit in Allen Stayt's reminiscences last issue, I received another letter from Allen with a couple of photos he'd taken of a large cross-compound Robey engine at Bunnings *Age of Steam Museum* in Manjimup, WA.

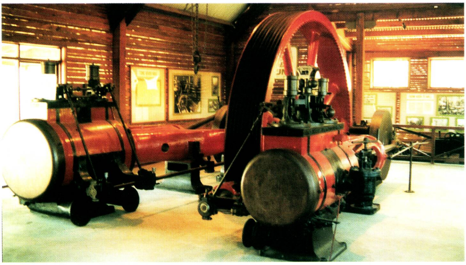


Photo 5

Allen thinks the signs there said that the engine was used to power a timber mill, but originally came from a sugar mill in Queensland. He asks if any readers can supply further information? On past performance I have no doubt of that whatsoever. **Photo 5** is of the engine in question — over to you.

Allen rightly comments that the layout of the engine doesn't look suitable for a crushing engine, but could have been used to drive a generator or vacuum pump. It certainly drove something via ropes from the flywheel, but most generators were by Bellis & Morcom in the sugar mills. I'm sure someone out there will have the answer.

## A beam engine with a difference

John Symons, whom readers may remember for his variations on the rotary valve engine some time ago, recently sent me some photos of his latest creations. As John has such a good writing style I'll quote his letter verbatim.

"In May last year I mentioned to you that I had decided to make a beam engine, and that before embarking on this endeavour I would try out some ideas on a 'test platform' so that my experiments wouldn't degrade a 'proper' model. Finally I have got around to completing the task which was often interrupted to attend to more urgent matters.

The exercise proved well worth while as I ended up with a better appreciation of what was involved in the construction of a realistic model. The photos give some idea of the end result of my experiments. (**Photos 6 and 7**).

I thought that a diecast enclosure,

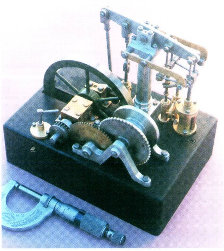


Photo 6

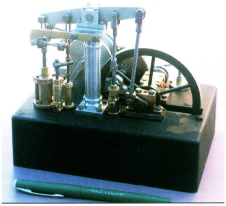


Photo 7

Photo 4

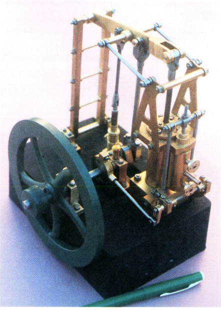


**Photo 8**

such as used for electronic projects, might provide a convenient base on which to build a model. There would be space inside for a small electric motor and batteries should this alternative energy source be required. In some circumstances this might well preserve domestic harmony.

I fabricated the column, with gudgeon integral for simplicity, then made the beam. Next followed the flywheel, the rim parted off a piece of scrap, the hub made from hex bar offcut and the spokes from 3mm welding electrode. As you might surmise the form of the flywheel was decided after the materials were gathered.

The long slot for the wheel weakened the box and below deck fortifying was necessary. This and the wheel prevented the installation of motor or batteries. It was awkward to remove the wheel and to replace it with a larger one was impossible so I decided it would be best in future to mount it outside the enclosure.

On completion it was soon apparent that a much heavier flywheel was required for the desired low speed. Some loading helped and this was provided by the use of heavy lubricant (SAE 20W50 oil) which also improves sealing.

The lump straddling the crankshaft is the valve system, enabling the engine to run for tests. It is intended to use a rod operated valve in the next model. The one discernable in the photo looks real but is not connected. It enabled me to devise a suitable linkage, however.

The winch just happened — due I suspect, to the influence of articles appearing in *Steam Chest*, and, after forty years of idleness, the little gears would be put to use.

Plain bearings were used throughout because, here, the effort required to make appropriate ones is not warranted. No packing was needed, just reasonably close fits.

Not having previously built a parallel motion I was uncertain as to the practical difficulties which might be encountered. I was careful to make the linkages identical and in alignment with the beam when horizontal. With the piston rod connected the cylinder could be precisely positioned and the mechanism functioned smoothly. This was reassuring.

Having got this 'mock up' reasonably complete I was considering building an improved version twice the size, as this would enable me to give attention to details, but this undertaking was postponed.

I was reading a book and came across a photo of an Easton and Amos Grasshopper. It came to me that this would provide an interesting diversion resulting in an attractive model, so I straight away took the first and most important step in its design, the survey of available materials. (And I emphatically deny that this process could in any way be described as rummaging amongst my junk!)

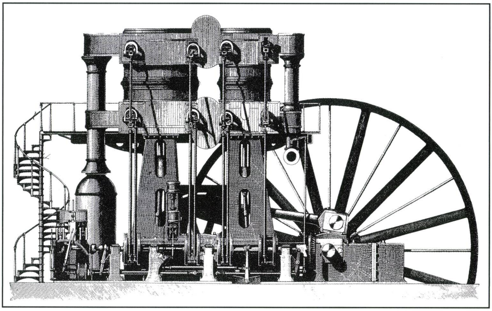


**Figure 2**

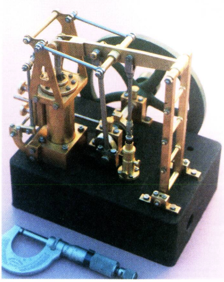


**Photo 9**

The first item I selected was a toy wheelbarrow wheel, circa 1930s, which, if it could be fitted with an appropriate rim, would be ideal.

I had been fortunate in coming by a quantity of brass offcuts which appeared suitable for transformation to the desired components. It was at this time that I realised that what I was about to design was a *Brasshopper*. The photo will give some idea of the final result. (**Photos 8 and 9**)

Creating the drawings was straightforward, deriving the dimensions from the illustration and modifying details to accommodate both the available materials and the capabilities of the builder.

The process of converting drawings to the physical reality was frequently suspended because of other essential jobs but finally the task was complete. Some light oil, a miniscule supply of air and the machine displayed it's characteristic motions. A very satisfying moment as you can imagine.

Well, Dave, you asked me for the full story when the task was complete, but I'm afraid that's about all I can manage. As you well know, every item, both in the drawing and the production, would have it's own story, so the full tale would take as long, probably, as the actual project.

I have included a couple of pages from *New Scientist* which you might find interesting. (*These covered a steam powered water jet engine and using nuclear power for space exploration - a bit outside this column's ambit ... DH*)

I can quite understand that flying model aeroplanes is more exciting than driving trains or winches, and I would have thought this to be a full time hobby. Then again, when I was somewhat younger .... regards, John Symonds."

Thank you so much, John, for a classic example of how we like to receive things for the magazine, and well done on both the writing and modelling aspects!

## Held over for next time

I've had some feedback on the steam accumulator, plus some information on the beam pumping engine at Goulburn. I have to do some more research on the first and sort out the details of the latter, so watch this space!

## A really superior model!

Finally for this time, I have some photos of a truly outstanding model which has quite a tale to it. Back in issue 91, July/Aug 2000, there was an article of mine on *Steam Power on the Keweenaw*, starting on page 35. One of the mighty engines featured therein was the engine called *Superior*, designed by E D Leavitt. When it was built in 1881 it was reckoned to be the largest steam engine in the world.

Shortly after that I received a letter from Bill Strotz in country NSW asking for more details on this engine, as he thought it would be a good one to build a model of. Thinking 'Good luck to you mate!' I sent him a package with all the material I had and thought nothing more of it.

Imagine my surprise and delight when a package arrived in the mail recently from Bill with a heap of photos of his model of *Superior*.

This is such a truly outstanding model that we plan to do a full feature article on it some time shortly, but in the meantime here are a few photos to whet your appetite. I'm also including one of the line drawings I have of the engine to show you the sort of information I had to send to Bill — no working drawings at all! **Figure 2** is the drawing, and as can be seen it is an inverted compound beam engine with the piston rods driving to a huge rocking wheel below the cylinders. From there the drive is taken by connecting rod to the massive crankshaft and flywheels. From these flywheels steel bands and rocking levers drove hoisting drums, air compressors and man engines spread over hundreds of yards of the Calumet & Hecla mine site.

**Photo 10** shows Bill's model from roughly the same viewpoint as the drawing. **Photo 11** is taken from nearly the same spot as the photo of the full size on p39 of issue 91. The main difference is that photo was printed upside down! And nobody mentioned it, at least not to me!

**Photo 12** is the other end view, and shows off the beautiful spiral staircase that Bill says was one of the things that attracted him to the engine. There are just a few handrails to go around the top platform and a few other details, which I hope Bill will be able to finish in time for more photos for the definitive article.

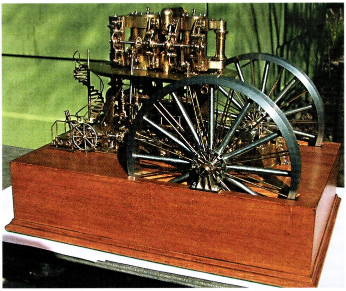


Photo 10

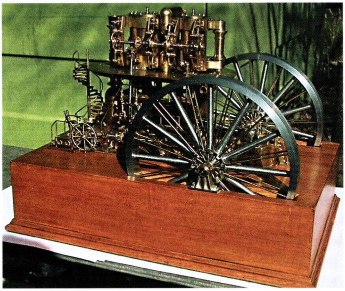


Photo 11

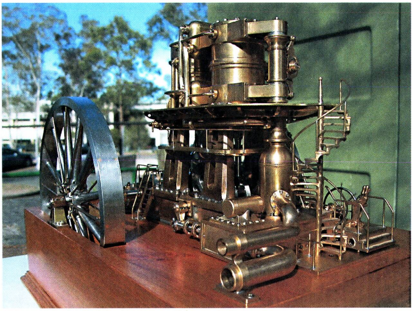


Photo 12

I think all readers will agree that this is one outstanding model, and I look forward to being able to provide you all with more details in the not too distant future.

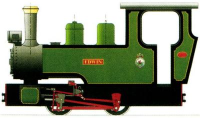
For now, some details of the model are: cylinders 25 and 44mm bores x 48mm stroke, flywheels 246mm dia. The actual model engine has overall dimensions height 220mm, length 395mm and width 155mm.

The full size engine had cylinders 40" and 70" bores x 72" stroke, and was rated at 4700HP! I hope to prepare an extensive article on the full size engine and the H&C mines to accompany the article on Bill's model. I'm excited!

That's enough for this time, until next time, happy steaming!

***You can email Dave on***
**sandave@bytesite.com.au**
***or write to him via the AME office***

# EDWIN



## *A freelance Fowler style 0-4-0 tank locomotive in 16mm scale for 32 and 45mm gauge*

**by Brian Wilson**

## Part 3

*Drawings and photos by the author unless otherwise indicated*

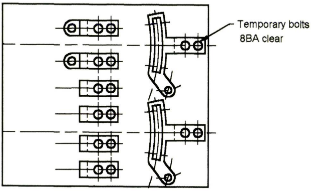
**Note regarding previous instalments:**
A couple of readers have asked about dimensions not shown on some drawings. Some of these were covered at the start of Part 2. The coupler height may be varied to suit the individual but this and the rivet holes in the buffer beams can be positioned by measuring from the drawing. All drawing sheets for *EDWIN* are and will continue to be published at the actual full size of the model to make life easier for everyone.

### Motion bracket and slide bar

The motion bracket and slide-bar are made in one piece, as it is difficult to find room to fasten a separate slide bar to the bracket with bolts or rivets. Mark out the bracket onto a piece of mild steel 1.5mm thick. Leave the piece dotted in and marked "A" to provide strength while the bar is being bent. It can then be cut away to provide clearance for the valve gear. It is important that the guide bar bends at just the right spot to give the 5.5mm distance from the centre of the piston rod, so it would be a good idea to have a few practice attempts on an offcut before tackling the real thing. (**See diagram 6**). Make a saw cut with a fine blade just at or slightly above the point at which you want it to fold, as in the diagram. Obviously the saw cut reduces the strength of the piece, but provided the cut is not too deep, it will still be amply strong enough. A 15mm length of 6mm x 1.5mm brass angle is riveted to the motion bracket to mount it onto the frames. Do not drill the mounting holes yet, they will be spotted through from the holes already drilled in the frames, when aligning the motion,

### Expansion link and bracket

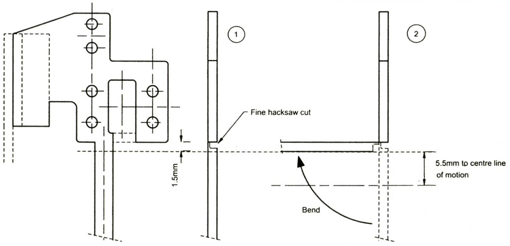
In a model as small as this, the expansion link is another one of those items where it can often be quicker and more accurate to make it by hand than by machining. There are well-documented methods and jigs made to facilitate machining links and if you wish to do this then by all means do so, but here we will approach it with hand tools. Before doing so, it is again a good idea to look at just where we need to be particularly accurate. Besides a good smooth curve for the die block to follow, the trunnions have to be in the right place and dead in line with the holes in the link brackets.



Suggested setting out for expansion links

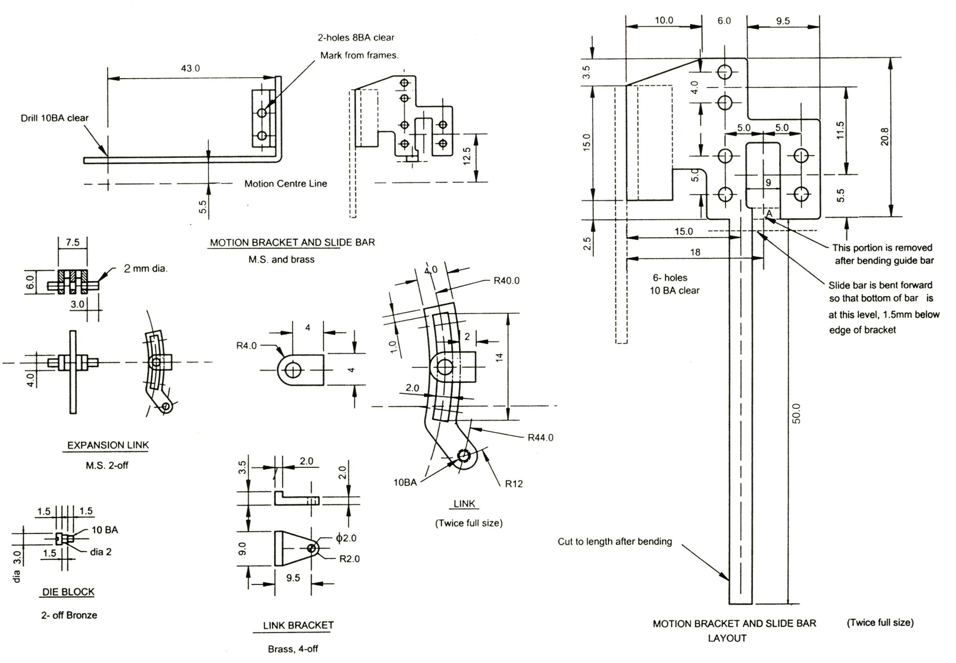
Diagram 7

Each link is made up from five pieces of 1.5mm sheet. (**See diagram 7**). Using a piece big enough to enable the radii to be marked out and the "tab" shown in the diagram to fit, mark out all the parts. Before cutting anything out, drill a chain of holes for the slot and the 10BA hole at the bottom. If you have a drill slightly less than 2mm, this should be used for the slot, as it will help in forming a clean edge when filing. Drill the 8BA clear holes for the temporary bolts. Using needle files, you can now file out the slot, use a short length of 2mm rod or a drill as a gauge to the finished size. The ends could be left rounded, but it looks better and takes only a moment to square the ends. Cut out all the pieces, clean up and polish as it would be difficult to do so later. Bolt together with the temporary 8BA bolts and check that everything lines up nicely. Drill two small rivet holes 1mm diameter through all the pieces and slightly countersink the outsides of these holes with a hand held drill. Take apart and thoroughly clean off any burrs and degrease. Bolt together again, apply some Loctite® to the rivet holes to fill any gaps and generally firm things up, then gently rivet together. After the adhesive has cured, the bolts can be removed and the "tabs" cut off. The holes for the trunnions can now be drilled and the trunnions themselves fitted. As we are not threading these, we could use silver or stainless steel rather than mild steel. Very



Bending the Guide Bar

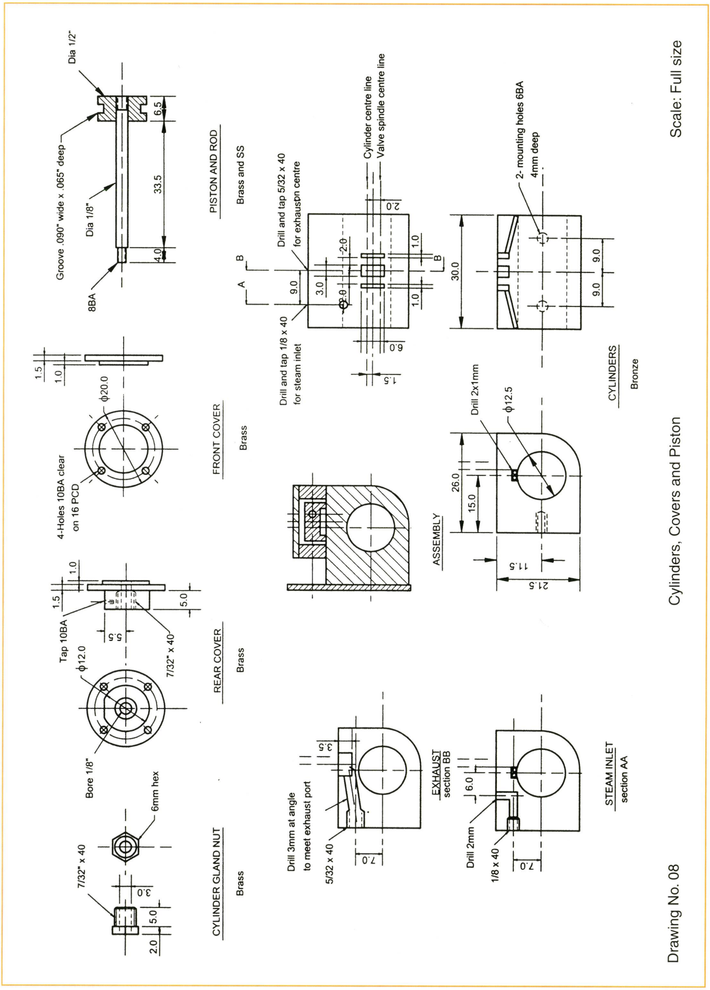
Diagram 6



Drawing No. 07

Motion Bracket, Link Bracket and Expansion Link

Scale: Full size, except where stated



Drawing No. 08

Cylinders, Covers and Piston

Scale: Full size

carefully mark out the position of the hole in one of the side plates of the link. Mount the link onto the top of a machine vice so that the other side plate is gripped in the vice and the link plate rests squarely onto the top of the jaws. (This is best done in the vertical slide rather than a drill press for more accuracy). Drill 2mm, making sure that it is marked out and set up so that the drill passes cleanly through the slot without touching it. (Two pieces of 1.5mm packing should be placed between the link and the side plates). A 13mm piece of 2mm rod is now passed through the holes and held in position with Loctite®. After this has cured, saw and file the inside piece out. This method ensures that the two trunnion pins are in line.

For the link brackets, take two pieces of brass or bronze and machine the faces square to 11.5mm x 9mm x 13.5mm. Mount each pair of brackets as a single block onto the motion bracket, and then cut in half. This will ensure that the bearing holes for the trunnions are lined up. Mark out the position of the trunnion hole and set up in the vertical slide so that the drill will be square to the side face and to the mounting face. Drill right through 2mm. The mounting holes for the link brackets can now be spotted through from the motion brackets, with a piece of 2mm rod placed through the trunnion hole and lined up to be square to the brass angle mounting face of the motion bracket. Remove the block, cut in half and shape the brackets to the sizes on the drawing.

## Cylinders

There are quite a lot of steps in making the cylinders, so they will probably take longer to make than any other part, but that doesn't mean they are any more difficult. They can be made from a block of bronze cut from a length of 38mm diameter material, which is readily available from one of the specialty bearing suppliers. The description for each cylinder is the same, the only difference being that they are handed. The valve face and the mounting face have to be exactly parallel to the bore and extra care has to be taken so as not to break the 1mm drill bit which is used for the steam passages.

Cut off two pieces of the bronze and machine two blocks to a finished size of 26mm x 21.5mm x 31mm. This can be done in the 4-jaw chuck, or a combination of turning in the chuck and milling, either in a vertical slide or a vertical milling machine. Make sure that all faces are truly square to each other. Coat the surface which will become the back end with marking blue and mark out and lightly centre pop the centre of the bore. Mount the block in the 4-jaw chuck, placing a thin piece of brass or copper under the jaw, which falls on the valve face to prevent marking its surface, and adjust so that the centre pop mark is running exactly at centre. Providing the jaws are in close contact with the work, the valve face and the bolting face should automatically be parallel to the lathe axis. Start the bore with a centre drill and drill right through with progressively larger drills, finally reaming out to ½". Take a light cut across the face, bringing the block to its finished length of 30mm and ensuring that the rear face and the bore are true to each other. Remove from the chuck and mark out the ports on the valve face. In practice, there is no need to make these ports with square corners as shown in the drawing — we just drill a series of holes along the line of the ports. **(See diagram 8)**. Mark out centre lines along the inlet ports and the exhaust ports. In the case of the inlet ports, mark for four holes, two touching the outside of the slot, and two straddled either side of the centre line. Make sure that the centre pop marks are far enough apart that the 1mm drill doesn't wander into an adjacent hole or you will almost certainly break the drill. For the exhaust port, two 3mm holes 3mm deep are required. Drill the 2mm steam inlet hole. To complete the steam passages, two 1mm holes have to be drilled from each end of the cylinder into the ports you have just drilled. The job must be firmly held and carefully set up at the correct angle to avoid breaking a drill and to make sure the passages open into the ports correctly. **(See diagram 9)**. Using a needle file, file a small flat into the edge of the rim in the position shown, (or slightly to the outside to match the port centres) so that the flat is perpendicular to the drill. Centre pop for two holes and start drilling, withdrawing the drill bit regularly to clear the chips. When the drill is about to break into the port, slow the feed and take particular care.

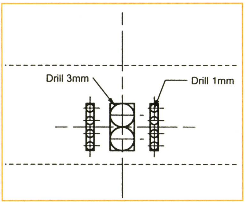
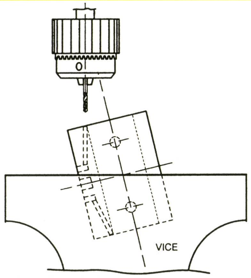


Diagram 8

Drilling the cylinder ports

After completing the steam passages, mark out, drill and tap only the front of the two mounting holes 6BA to a depth of 6mm. (The second mounting hole will be spotted through from the frames later). Mark out the holes for the exhaust and steam inlet and tap the exhaust $^1/_8$" x 40 and the steam inlet $^5/_{32}$" x 40, both to a depth of 4mm. The steam inlet is drilled with the tapping drill to meet the previously drilled hole in the port face, while the exhaust is drilled with a 3mm drill at an angle to meet the exhaust port and clear the bore. There is not a lot of room here so make sure the drill does not break through into the bore. Believe me, a broken tap would be like a visit to heaven compared to breaking through into the bore!



Drilling the Steam passages in the cylinder

Diagram 9

The cylinders are now put aside until the steam chests and covers are made, when we can mark out and drill the mounting holes for these.

## Cylinder covers

The front covers are a simple turning and drilling job. For appearance, a small relief can be turned into the forward face. (It is assumed that for the piston rod and valve rod material, the stainless steel will be Imperial sizes, i.e. $^1/_8$" and $^1/_{16}$" respectively).

When making the rear cover it is essential for the bore to be concentric with the mounting spigot which fits into the cylinder, and the small flat on which the guide bar rests much be the correct distance from the centre line. Grip a piece of suitably sized brass in the 3-jaw chuck and turn the rear gland shoulder to 12mm. (Note the exact measurement for this, as we will be using it later). Drill and ream $^1/_8$" to a sufficient depth and drill and tap $^7/_{32}$" x 40 for the gland nut. Part off and repeat for the other cover. Make a mandrel by gripping a piece of 10mm brass in the chuck and threading it $^7/_{32}$" x 40 with a $^1/_8$" spigot on the end to match the bore and thread in the end cover. Screw the end cover tightly onto the mandrel and turn the face, making the 1mm thick shoulder a good fit into the cylinder. To machine the small flat onto which the guide bars rest, grip the cover in the vice mounted on the vertical slide so that the face is held onto the jaw of the vice. Bring the job up to an end mill and from the position where it just touches, take off 0.5mm, using handwheel graduations. This should give a distance to centre of 5.5mm, which can be checked with a vernier measured across the whole gland shoulder. Drill the four 10BA clear mounting holes in the covers and finally, with a small end mill or even a drill bit, remove a small portion of the mounting shoulder from each cover where it lines up with the steam passages. This will ensure a clear passage for the steam and condensate.

## *EDWIN* components now available

Due to the popularity of the *EDWIN* series, the author, Brian Wilson, has done some homework and is now able to supply some components for you.

**Full set (approx 30 components)**

comprising laser cut frames, footplates, beams, main rods, valve rods expansion links, reversing lever and stand for **$112** (incl. P&P within Australia).

**Part set**

comprising the above without frames, footplates and beams can be made available for **$85** (incl P&P within Australia)

Purchase direct by sending a cheque or money order to:

**PO Box 525**
**Toowoomba Qld 4350**

*Overseas readers should enquire about additional mailing costs.*

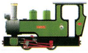
Brian is also arranging to supply lost wax castings. These will initially include the crossheads and return cranks, to be followed by the smokebox door, chimney base, dome bases and perhaps some other fiddly items. Availability and pricing not available as we go to press, but full details will appear in the next issue of *AME*. In the meantime you could get details from Brian by writing to the above address.

### Piston and rod

To make the piston true to the rod, we rough turn it first and then finish to size after it is screwed on.

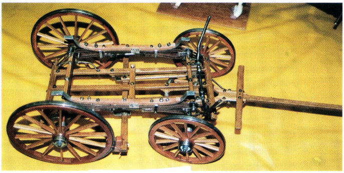
Take a piece of 16mm diameter brass rod and rough turn it to just over 12mm diameter. Drill through with a tapping size drill for 1/8" x 40 and then open 3mm of the hole up to 1/8". Thread the remaining 3.5mm, using the tap holder held in the tailstock and part off, leaving slightly oversize. As mentioned previously, it is probably more precise for the following operations to set the work up in the 4-jaw chuck unless your 3-jaw is particularly accurate. On one end of a piece of 1/8" diameter stainless steel rod, thread 8BA for 4mm. Cut the piece to length, turn around and set up to run exactly true and thread 1/8" x 40 for a length of 3.5mm. Now screw on the piston blank as tightly as possible, using some high temperature Loctite to help prevent any future movement. Finish turn the piston to be a sliding fit in the cylinder bore and turn the groove for an 012 'O' ring. Data sheets suggest this should be .090" wide x .065" deep (2.30mm x 1.65mm). This can be done with a small square tool such as a parting tool. Measure the width of the tool with a micrometer, then carefully run it into the work to the depth of .065", noting the reading on the compound slide. Withdraw the tool and using the graduations on the compound slide, advance the tool a distance of .090" minus the width of the tool bit. Again run the tool into a depth of .065" and then complete the groove according to the width of your tool bit.

*To be continued ...*



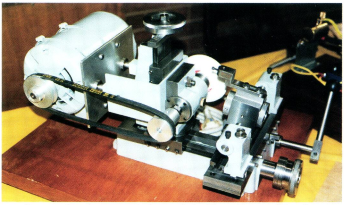
# 5th National Bendigo Model Engineering Exhibition

### Photographic report by David Proctor

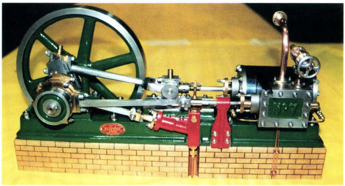


*Norman Brown of Batlow, NSW is making this 90% complete 1/10 scale thoroughbrace coach, one of several early vehicles he displayed.*

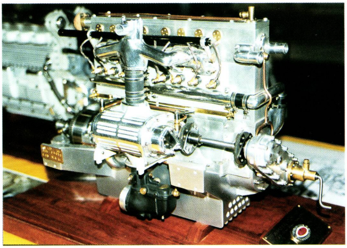
*This was one of many aircraft models on display*



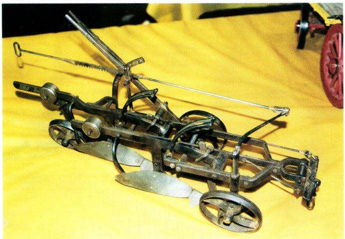
*Stent tool and cutter grinder made by Terry Evans of Bendigo*



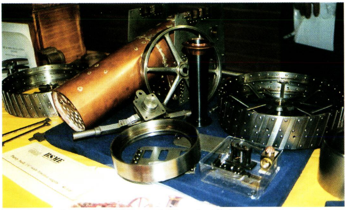
*This finely finished mill engine,* Sophie, *was built by David Kershaw of Melbourne from E & J Winter's No.7 castings*



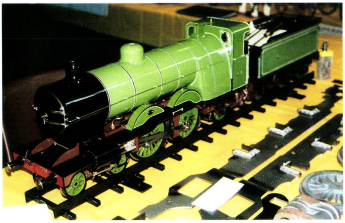
*Michael Marchant's large display of finely built engine models included this one third scale Bugatti Type 35B*



*$^1/_6$ scale Lennon double farrow stump jump plough of 1884 vintage*

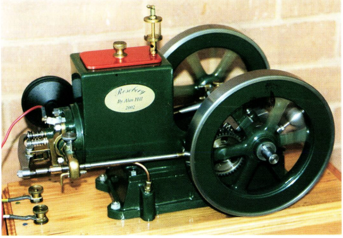


*Peter Keown is building a 1.5" scale Allchin traction engine*

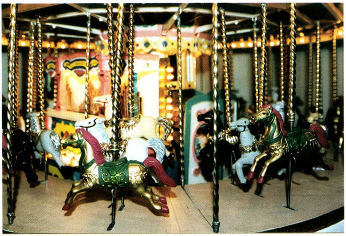


*Chris Murray built this trophy-winning 3.5" gauge* Maisie

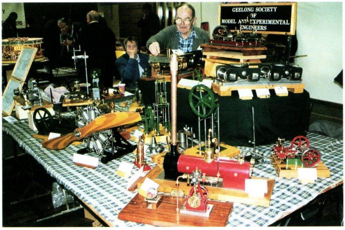
*A small part of the Melbourne Meccano Club display*



Rosebery, *a hit and miss engine by Alan Hill*

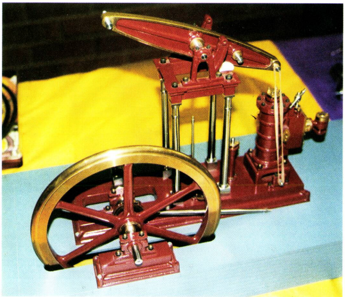


*Reg Thorne of Bendigo built the exquisite $^1/_{16}$ scale 3 abreast carousel which is shown on the front cover. The many hundreds of individual pieces, as we can see here, are all beautifully hand made.*

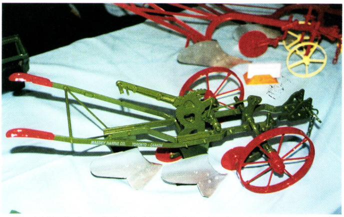


GEELONG SOCIETY OF MODEL AND EXPERIMENTAL ENGINEERS

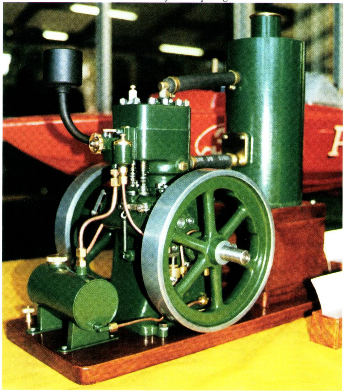
*The Geelong SMEE always stage an interesting and varied display*



*Tubal Cain designed beam engine* Mary *is being built by David Tenny from Bendigo. The design is of an engine circa 1850's.*

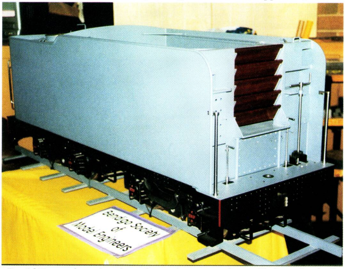


*David Boyle from Lake Goldsmith, Vic. displayed a huge range of farm machinery models, one of which is of this Canadian built Massey Harris two furrow plough*



*Another of several engines on Alan Hill's display table*

*This one quarter scale model of a Rider Ericsson Hot Air Pumping Engine was built by Graeme Johnson who also produces the castings at his Sea Dragon Foundry & Engine Works in Shepparton, Vic.*



*David Tenny doesn't only make stationary engines. He has also built a very nice tender for 7.25" gauge Queensland Railways BB18$^{1}/_{4}$ class Pacific locomotive*

*And to finish — a night shot of Reg Thorne's carousel*

# Steam Power

## Its evolution, application and the traction engine — part 3

### By Ken Preiss

## The traction engine

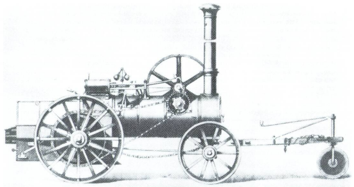
As is often the case, recognition for first making these portable engines self-propelled and the date at which this was done is unclear. One version gives the credit to Ransome's of Ipswich in 1840. Another reports that the "steam road engine" did not appear until after the Great Exhibition of 1851.

Other accounts report that Thomas Aveling, a Kentish farmer, dissatisfied with hauling the portable engines from site to site, set out to make them self-moving. This he achieved by fitting a Stephenson's Link (developed a decade earlier) to the engine, and behind the firebox a live axle with sprocket connected with a chain to another sprocket on the crankshaft. For this he became known as the "Father of the Traction Engine". The reference to Stephenson's linkage would date his work at about 1852.

A feature copied from the railway engines was the tender. This provided the driver with a footplate to tend the engine, a space for the coal, and underneath a water tank. On the traction engine this was filled by bucket into a "water-pocket" or by a "water-lifter" and suction hose from roadside streams or ponds. Levers were at hand to operate the regulator controlling engine speed, the reversing linkage and the gear change mechanism.

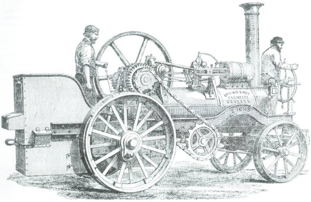
## Steering

These first engines were initially steered by a single horse hitched to the wagon-type turntable and directed by a steersman. This proved unsatisfactory, as the smooth wheels did not grip on wet ground, and particularly if the driver put the engine into reverse! Later an extension to the turntable was fitted with a single wheel carried in a fork. A tiller controlled by a steersman seated in front of the smokebox operated this. This also was found to be unacceptable, for the extension took up too much room and the pilot wheel lost grip on rough ground.



*The first traction engine built by Thomas Aveling*

A subsequent development provided the steersman with a ship-type steering wheel connected to the axle by bevel gears and a rack and pinion. This was hard to operate but gave positive control and lasted quite a long time. It did however have the drawback of the steering not being under the direct control of the driver, a situation that gave rise to some heated exchanges between driver and steersman when the engine was being manoeuvred in a tight situation!



*An early Brown & May double chain engine with 'ship' wheel*

The "chain-and-roller" method, invented by Aveling, literally put the steering in the driver's hands. This remained in use until Ackerman steering was introduced on steam wagons in the early 1900s. Chains were fastened to each side of the front axle, crossed over each other, and given a few turns in opposite directions around a 3" drum fitted to the front of the firebox. This was turned by a worm and worm-wheel connected by a spindle to a steering wheel operated by the driver on the footplate.

## Drive train and road speed

Like steering, the drive train from crankshaft to wheels evolved and improved over the years. After the direct drive from crankshaft to back axle two basic drive trains systems were developed. Engines using these were known as "three-shaft" or "four-shaft" engines. Within these configurations there were naturally variations between manufacturers and models.

The flywheel was usually located on the nearside (driver's left) and originally the drive to the axle was by chain on the offside (driver's right). With this direct drive from the crankshaft a forward, reverse and neutral could be achieved by use of the Stephenson's linkage. This had drawbacks (and one imagines some dangers!) in that precise control was difficult and machinery could not be driven from the flywheel without disconnecting the drive to the axle.

The problem was overcome by fitting a bracket-mounted gear and sprocket below the crankshaft and a sliding pinion on the crankshaft. This pinion could be slid in-and-out of mesh providing a means of disengaging the drive.

For driving threshing machines the best engine speed was around 200 rpm. This was achieved by the use of a governor that kept engine speed constant under varying loads. Various types were fitted but the Pickering governor; an American design was widely used from the early 1900s.

With the single-speed drive this gave a road speed of about 3 mph — too slow for travelling and too fast for manoeuvring in farmyards and tackling hills. Various schemes were tried to achieve a second speed, in retrospect some not very practical!

An early solution was to replace the bracket-mounted gear and sprocket with a countershaft. High and low-speed pinions were fitted either side of the crankshaft, and matching gears, free to slide, on the countershaft. These sliding gears were each controlled by its own lever. Although it was possible on some engines to engage both gears at the same time others were fitted with interlocking levers or differing fulcrums to prevent this problem. Engines with the countershaft were known three-shaft engines, with the crankshaft, countershaft and rear axle each counted as shafts. The drive to the axle remained on the nearside, but the chain drive was replaced a pinion and spur wheel.

A development of the above arrangement was to fit a compound spur gear on the offside of the countershaft. To change speed large or small interchangeable pinions were manually fitted to the crankshaft. The pinion not required had to be pulled off, placed on the footboard, and replaced with the required one. These cast-iron pinions were about twelve inches in diameter, and it was not a popular practice, particularly if one was dropped on the ground and had to be lifted up again! It was said drivers seldom put on weight until this system was abandoned in favour of a sliding compound pinion on the crankshaft, controlled by a single lever, meshing with the required spur gear on the counter-shaft.

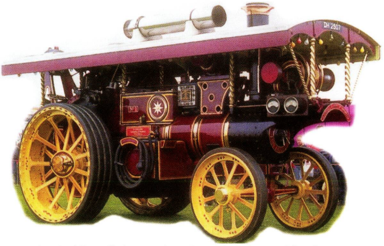
Over the years the cylinder had been moved forward from its initial position over the firebox to the smokestack end of the boiler, and the plates on the side of the firebox were raised to form a primitive crankcase. Because of the extra distance between the crankshaft and countershaft these changes allowed (and indeed required) the drive train to include another countershaft. This gave rise to the four-shaft engine. A high and low-speed compound gear was fitted on splines or a squared portion of this extra countershaft. Between gears, spaced slightly apart on the flywheel side of crankshaft, this compound gear could be slid across to mesh with the appropriate gear on the crankshaft. This arrangement proved more practical as road use was increasing and remained in use until the end of the traction engine's reign. Speeds of 2 mph for farm work and 4 mph on the road were typical.

Other improvements were the incorporation of a "compensating gear" or differential to reduce scrubbing the roads and make steering easier, and a cable attached to a winding drum for pulling stumps or other hauling applications. These devices could be engaged or locked by removable driving pins in one of the rear hubs. The wheels too were modified from the narrow, smooth rims on the portable engines by making them wider and adding "strakes" to provide a better grip. These were angled to reduce vibration when used on the road. Cleats or "spuds" could also be attached to the rear wheels for use in heavy mud. Some engines were fitted with a front mounted jib crane and were the forerunner of today's mobile cranes.

## Variants and derivatives of the traction engine

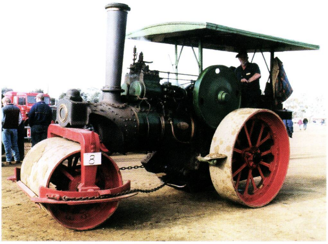
Over the years the basic traction engine was modified and adapted for other specialised work. Larger road locomotives had three speeds, were fitted with front and rear springs and an extra water tank under the boiler. They could haul trailers carrying loads of up to 120 tons.

Another version of these giants was the showman's engine, used to pull strings of wagons with fairground attractions from village to village. These engines were highly decorated, adorned with polished brass and usually had a canopy supported with twisted brass columns. Most had an electric generator fitted in front of the smokebox and a string of lights around the canopy.


*A typical Burrell showman's engine — large, powerful and ornate*

The general-purpose engines were unsuitable for ploughing as their weight compacted the soil and they were difficult to manoeuvre in the fields. In the 1840s John Fowler (1826-64) invented a steam mole for laying clay pipes to drain waterlogged fields. In 1856 he patented a method of ploughing using special ploughing engines. They worked in pairs, one either side of the field. A plough, attached to cable wound on a horizontal drum under the boiler, was pulled backward and forward across the field. These engines were large, longer (because of the winding drum), and, because the crankshaft was further from the back axle, were among the first of the four-shaft engines. Fowler ploughing engines remained the favourite for this work until diesel tractors replaced them.

Perhaps the best-known adaptation of the traction engine was the steam roller or road roller. These had smooth rear wheels, somewhat wider and heavier than those on traction engines, and a pair of rollers in the front carried in a fork mounted on an extension of the smokebox. They were working in Britain into the 1960s and, in their diesel form, are still a common sight on road works.


*Fowler was one of the major builders of steam rollers*

At the beginning of the 20th century fairly radical changes to the general-purpose traction engine produced a range of steam wagons or lorries. These had four or six road wheels (usually smaller and with solid rubber tyres), a van body or tray (sometimes tipping three ways) and were of two types. The early ones were "over-types" with the engine mounted over the boiler as in the traction engine and were capable of speeds up to 30 mph. The "under-type", with a vertical boiler and the engine mounted under the chassis, was a later development. Fitted with pneumatic tyres they could reach speeds of 60 mph and were in use until the start of the Second World War. As child I can remember Harris Scarfe's steam wagons coming up Grenfell Street in Adelaide and turning into their yard.

## William Allchin Ltd.

Over the years there were some twenty firms making traction engines in England. Some of the well-known names include Aveling & Porter, Charles Burrell & Sons, William Foden, John Fowler & Co. and Marshall, Sons & Co. Lesser known (apart from model engineers) was the firm of William Allchin of Northampton founded in the mid-1800s. It is said they had a cavalier attitude towards spares, and these rarely fitted without considerable filing and scraping. The company claimed most wearing parts could be made by any small local workshop, or alternatively it would send a man out to fit the parts on site. Somewhat later than other makers they introduced the Pickering governor around 1912. Perhaps not surprisingly they went into voluntary liquidation in 1931, when the boiler shop was said to be "... needing only a few horseshoes on hooks to resemble a blacksmiths".

However Allchins were probably the first to use a bored cylindrical guide for the crosshead when current practice was to use two pairs of parallel bars. Other manufactures later adopted this superior cylindrical guide. Although both speeds could be engaged at once on their early engines they were one of the first to adopt the compact, and narrower, four-shaft design. This subsequently proved to be an excellent choice. Like other manufactures they ventured into steam rollers, but these were not a success and only six were made. However from 1912 they had some success with their three-speed steam wagons fitted with Ackerman steering.

*Peter Smith built this 4.5" Allchin to the Royal Chester design.*

## *Royal Chester*, a popular model

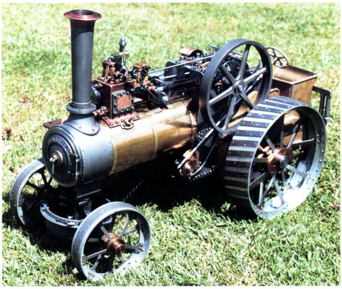
Allchin's most famous engine was probably the 7 nhp *Royal Chester*, as it has been a favourite of model engineers for some forty-five years. It was the last traction engine made by the firm and was intended to be shown at the 1925 Royal Show at Chester. Although it never officially carried the nameplates *Royal Chester* this was the name tentatively assigned, and that which has been adopted. It spent most of its working life in Derbyshire.

In 1948 W. J. (Bill) Hughes saw the engine lying derelict in company with two other Allchins and a Marshall. It took his fancy as a model engineering project and following numerous visits he made a dimensioned drawing and later sixteen sheets of working drawing at a scale of one-and-a-half inches per foot (1: 8). An excellent set of black-and-white photographs of the prototype was taken around this time. The other three engines were shortly after cut up for scrap but *Royal Chester* was purchased by a pioneer preservationist and later restored. In 1996 Gerald Russell of Bordon, Hants, owned it and it was seen under steam at a rally at Kingsley, Hants.

The *Model Engineer* started a series of articles by Hughes in 1957 describing the construction of the model, and due to their popularity these were re-written and run again from 1972 to 1976. A firm of model engineering suppliers, A J Reeves of Birmingham sell sets of drawings, castings and other parts for the model. From 1972 until the mid-90s they have supplied some 2,200 sets of drawings to enthusiasts around the world. Other modellers have made quarter- and half-size versions of the original engine.

These engines are true working models. They incorporate many of the features mentioned above, including Stephenson's linkage, positive two-speed gear change mechanism, chain and roller steering, Pickering governor, compensating gear (differential), water-lifter, and winding drum with cable. Other typical devices are fitted. These include feed pump and injector, both to supply the boiler with water, lubricator to oil the cylinder, safety valve, steam pressure and water level gauges, and parking brake — all of which work!

A J Reeves went into voluntary liquidation in October 2000 but fortunately the company has been purchased by Anker Towbars who intend to continue trading much as before. It is hoped *Royal Chester* will remain popular and continue to be a challenging and instructive model of a past era in steam transport.



*Ken Priess' model of Royal Chester is to 1.5" scale*

## The following sources were consulted:

**Steam Engines : an international history**, Howard Jones (London, Ernest Benn, 1973). An excellent and comprehensive history of steam engines and their application in various fields.

**The Compleat Traction Engineman**, E. E. Kimbell, (London, Ian Allan, 1973). Written by a former traction engine driver the book covers the history of different machines, their use and driving techniques.

**Traction Engines in Focus** : over two hundred photographs showing traction engines during their working days, John Crawley, (Turvey (Beds.), John Crawley, 1982). A pictorial work, of particular use in checking details of various the design features.

**Steam at Thursford**, George Cushing with Ian Starsmore, (London, David & Charles, 1982). The author tells of his experiences as an engine driver and contractor, and of his passion for preserving steam traction engines, fairground rides and organs. These are displayed, under cover, at an outstanding museum at Thursford, Norfolk.

## Websites

**www.ranger.demon.co.uk/aveling/aveling.htm** "A Steam Dinosaur : The world's oldest steam traction engine found buried in an English coal mine"

**www.geocities.com/Athens/1992/howebiog.html** "A short biography of William Howe ... inventor of the Stephenson reversing link motion".

**www.geocities.com/Athens/Acropolis/6914/stephe.htm** "Early steam engines 1690-1840 ..."

**www.geocities.com/Athens/Acropolis/6914/trevie.htm** "Richard Trevithick - 1771-1833"

**www.greatwestern.org.uk/basic10.htm** "Back to basics : Section 10 - Superheating".

**www.sdrm.org/faqs/boilers/page65.html** "Locomotive Boilers and Engines - Superheaters".

**www.steam-up.co.uk/useful_terms.htm** "Traction Engine Terms Explained".

**www.steam-up.co.uk/traction_engine_history.htm** "A Concise History of the Traction Engine."

**www.flysteam.co.uk/history.htm** "History [of Steam Powered Aircraft]"

***This is to remind you ... that AME has a new email address ...***

**ame@netspeed.com.au**

# Rob's Diesel

## A basic narrow gauge battery powered locomotive for 5" gauge

### by John Campbell

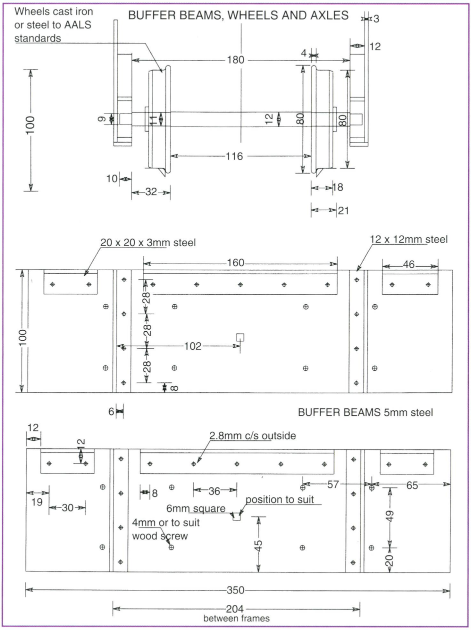
## Part 2

### Axle box guides and spring pockets

The guides are made from 12mm square bright steel bar. Black bar may be used if you polish the sliding surfaces. The horns are 37mm long and should be squared off on each end. My steel supplier is happy to cut these pieces to length which saves a lot of work. One horn is riveted to the frame at each position and the second horn may be clamped against it with an axlebox with a paper shim while it is drilled and riveted. The spring pockets are 12 x 25 x 54mm and 2 pieces of 12mm square steel would also be quite suitable.

*Just to whet your appetite — Rob gives the loco a run at Wagga Wagga*

You will need to find 12 springs which will support the weight of the loco, about 50 kg. It may not easy to find suitable springs. My springs are 8mm diameter, 29mm long, and have 11 turns of 18 s.w.g. (approx. 1mm) wire. This will give you some idea of what you are looking for. Drill the pockets to suit the springs, leaving the pockets shallow at present to allow for later adjustment. The pockets are riveted to the frames. I use the kitchen scales to find the load which the springs will support, pressing down on the scale pan. The springs should be "lively" to absorb rail shocks.



### Horn ties

These are 3mm steel, 15mm x 54mm to match the hornblock and frame assembly. They should be clamped to the assembly while drilling the tapping size holes in the horns. There are not many holes to tap in this locomotive and it is worth buying good quality taps. You need intermediate and taper 4mm taps and a 3.4mm drill for tapping. An intermediate 3mm tap and a 2.6mm drill will be needed later. A little screwing oil will make life easier and remember to clear the chips when you are tapping blind holes.

You will need some 4mm screws to assemble the frames and I suggest the use of high tensile hexagon head screws. You will need about twenty four 4mm x 15mm screws and the ones used for the horn ties will need to be shortened. If you decide to bolt the frames together the bolts will need to be 20mm long.

### Motor mounts

The motors are suspended from 10mm cross shafts which are carried in bearing blocks. These blocks are 10mm thick and 32mm square and may be

*Rob works on the wheels*

of any metal. The mounting blocks for the motor shaft and the countershaft are attached by 3mm screws and if the nuts are placed outside ordinary pan head screws will be satisfactory. You will need about 100 screws with nuts to suit. The blocks are located by buttons while the mounting holes are drilled. It is advisable to number each part so that it can it can be easily reassembled. You will see later that the bolts for the rear right block also attach an angle for the brake column.

## Countershaft mounts

These blocks are 32mm square and may be of any metal bored to suit the ball races. The countershaft is 10mm steel turned down at each end to fit the races.

## Buffer beams

As already stated these are of 5mm steel, 100mm x 350mm. They have a 6mm square hole for the coupling, placed to suit your needs, and rivet holes for the corner blocks and for the angles for attaching the floor and cabin. Wood block buffers may be fitted and holes for mounting these are suggested. When the motor position has been finalised there will be another small angle inside the front buffer beam to which the motor torque rod will be attached. The reason for this mounting is to allow adjustment if you decide to change the sprocket on the motor shaft.

## Buffers

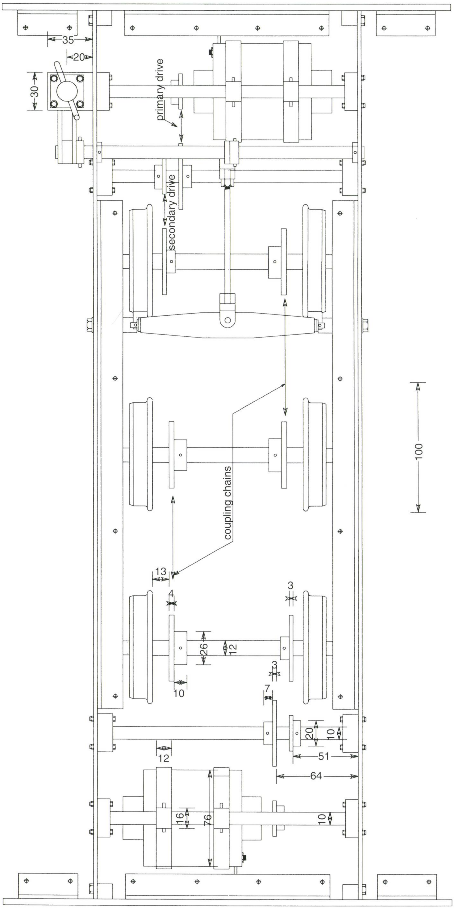
Dumb buffers of wooden blocks 70 x 65mm and 36mm thick may be fitted with wood screws or by through 4mm bolts. If you prefer standard type buffers may be used or a combined central buffing block and coupler socket could be used.

## Corner blocks

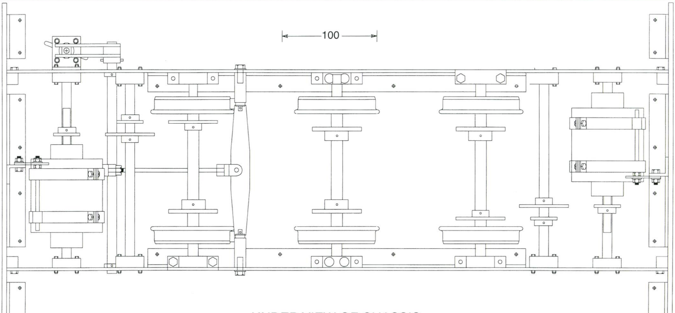
The frames are joined by corner blocks of 12mm square steel riveted to the buffer beams. The main frames may be attached either by screws tapped into the corner blocks or more easily by through 4mm bolts. The frames are clamped to the blocks while drilling and tapping is completed. Before drilling make sure that the frame assembly is square and level. A good flat off cut of 12mm chipboard will make an adequate "surface plate" for this task.

## Wheels

The wheels are 80mm on the tread. The size is not critical but all wheels must be the same. I use cylindrical or "flat" treads but they are otherwise to AALS standards. The radius between tread and flange is particularly important. There is no need to have spoked wheels as they



PLAN VIEW OF CHASSIS



UNDER VIEW OF CHASSIS

are well out of sight. If castings are not available the wheels could be made from steel blanks cut from bar but there would be a lot of work if your lathe is a light one like my ML7. Since building my tram I have turned several sets of wheels from blanks from free cutting steel bar and have not found it difficult with sharp high speed tools although there is a great accumulation of swarf. Do your best to ensure that the axle holes are bored truly, finishing with a reamer if possible. If on assembly there is a slight amount of wobble it may be ignored, but if the wobble is too much for your peace of mind the wheels can be trued on their axles using the centres detailed. Remember that the wheels must all finish at the same diameter.

## Axles

The axles are made from ½" or 12mm bright steel. I use ½" as it will fit in the Myford collets. With 12mm axles there is very little shoulder for the wheels to butt against and bit larger steel might be wise.

There should be a little endplay in the axle boxes so check the distance between the bearings before cutting to length. The axle ends should be a light press fit in the bearings and the wheel seats may be a press fit in the wheels. It is simpler to make an easy fit for the wheels and use high strength Loctite®. If you are using Loctite place the assembly on end while it sets to minimise the possibility of running out of truth. Do not assemble all the wheels until all the sprockets are in place.

## Coupling chains and sprockets

The axles are coupled with 3/8" pitch chain and six 16-tooth sprockets are needed. These are a stock size. The sprockets may be attached to the axles with Loctite® and should be placed close to the wheels allowing space for the chain and joining links. 1/8" roll pins can be added to make sure if you wish.

## Countershaft drive

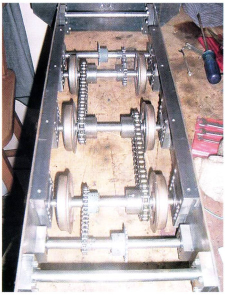
I have specified ¼" pitch chain and 11 and 22 tooth sprockets for the primary and secondary drives. The final reduction is 4 to 1 and with a 3000 rpm motor should give a top speed of just over 11 kph. The motor sprockets must be bored to fit the motor shaft, 8mm or whatever it may be, while the countershaft sprockets will be bored 10mm to fit the shaft and the last sprockets are bored to fit the axles. When the assembly of sprockets and chains is completed you can make a trial assembly of the countershaft and if all is in order the sprockets are Loctited to the shafts. The countershaft bearings can now be attached to the frames.

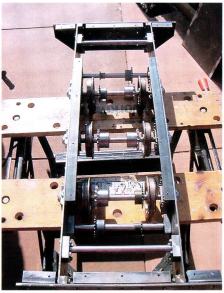
## Motor and mount

The motors are 12 volt permanent magnet motors which drove the circulating fans in Japanese car air conditioners. They run at 3000 rpm and draw a very heavy current when stalled. When you are looking for a motor look in through the holes in the end plate at the wiring. This appears to me to be about 18 gauge or approximately 1mm in diameter. I have recently found similar motors rated at 190 watts which would be very suitable.

The motor is suspended from its shaft on two 12mm steel straps with brazed bushes. Two smaller bushes hold a cross pin to which the torque rod is attached. When everything is lined up the main bushes are pinned or set-screwed to the shaft and the position of the 3mm angle on the buffer beam fixed. You should now be able to roll the completed chassis along the floor or track with ease. Any tight spots should be fixed as there is no power to waste.

*To be continued ...*



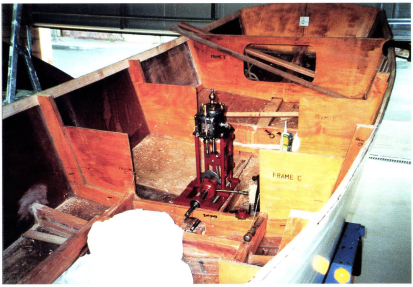


Wayne Roberts of **Model Engineering Supplies** can supply the components to build this loco. Full details and prices in the next issue.

# The *Lady Patricia*

## A Steam Launch Built by Bob Tanner

### Story by Steve Reeves


*First trial setup of the engine. Hull construction can be clearly seen*

Bob Tanner is a power station controller who works for Alcoa at their power station in Cockburn Sound in Perth, Western Australia. During the 1970's he spent a few years at sea on steamships. This left a lasting impression and a desire to own his own steam launch.

The project began in 1997 and is based on a design by Paul Fisher from England. Paul has a good reputation as a designer of the ubiquitous trailerable steam launch, as found on the canals of Britain. Having never built a boat before, Bob decided to seek advice from a friend who had recently completed a plywood-epoxy resin hull. This calmed his initial anxieties as well as enabling him to learn the intricacies with this form of construction. The result is a 4.7m (15' 5") long wooden hull, which was built the traditional way, upside down starting with the ribs. Next the outer plywood sides are attached and sealed with the epoxy resin. All this is done using the normal wood working tools. Ornate woodcarving was carried out on the fittings, seats etc. in the Victorian period to set off the look. The inside of the hull is yet to receive the wood veneer lining. The rudder is also made of wood with stainless steel hinges that enable it to be removed and it also has a removable tiller.

The propeller shaft proved an interesting project. It started as a design that could have moved the *Queen Mary*! Friend Barry Balchin of NSW redesigned this. It uses a stainless steel shaft running in Teflon plain bearings that are water lubricated. The present propeller was given to Bob but is designed for a modern petrol engine. It does work but turns slowly for efficient operation and will be replaced with one of a courser pitch. The shaft is attached to the engine via a sprocket and chain drive at 1:1 ratio. As the engine has plenty of power the ratio is going to be changed to 2:1 which will slow the engine down so the auxiliaries such as the axle pump will operate more efficiently.

The power plant is a single cylinder engine of 3" x 3" (75mm x 75mm) bore and stroke. Its design is an adaptation of a sketch by the late Professor Evers Burtner from the USA. Most of the engine has been fabricated with the cylinder block the only casting. Slip eccentric valve gear has replaced the original helical reverse gear and is based on a design published in *AME* a few years ago. The engine is reversed using a toothed lever that engages on a gear wheel attached to the eccentric. Fittings include a water trap, drain cocks and a displacement lubricator. It is painted maroon with lots of polished brass.

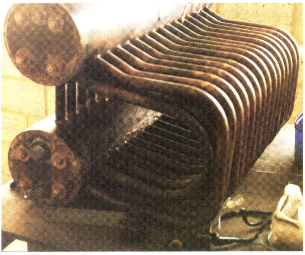
The boiler is of 20 litre capacity and made of 3mm thick copper. It consists of 2 drums 150mm in diameter by 600mm long. These 2 drums are connected together by "U" shaped copper tubes as well as some vertical down connections. NDMES club member Ernie Redford has his own engineering business and was thus able to bend the "U" shaped tubes on the pipe-bending machine. This enabled 3 tube profiles to be mass produced thus keeping a uniform shape without kinking. All the bronze bushes use BSP threads so that commercial fittings can be used. The boiler sits in a large rectangular casing which is lagged but yet to be fitted with decorative brass angle at all the corners and edges. So that no rubbish ends up in the river a large deep ash pan with air control damper has been fitted. A cast grate from a slow combustion heater has been used so that the boiler can be wood/coal fired. The boiler will steam for 45 minutes on half a dozen pieces of wood approximately 120mm x 250mm long.

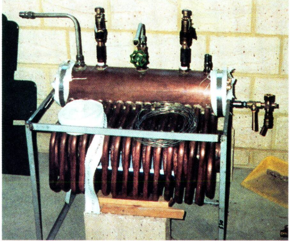
A commercial boat trailer was purchased second hand, it is of single axle design and has had the supporting rollers modified to take the shape of the hull. Special guideposts have also been fitted to guide the launch onto the trailer at the end of a days sailing. A winch pulls the launch in and locks it into place.

First steam trials were on a quiet weekday morning, just before Christmas 2001. As Bob lives near the Swan River, he did not have far to go! These proved very encouraging with only minor problems showing up. In fact the hardest part was launching and retrieving.

The launch still has many bobs and gadgets still to be fitted and

*Rudder, propellor and stern details*


*The boiler showing the three different tube profiles*



The completed boiler in its construction frame

Wally and Bob sail for the first time

will be done this winter when its too wet to sail! Some of these include the axle pump, steam siren, a condenser with vacuum pump and a whistle. Also to be fitted is a folding canopy and one of those steam boat essentials — a Windermere Kettle.

Although a member of the Steam Boat Association of Australia, there are no steam boat clubs in Perth. There is however a regular gathering of people at the "Flying Angle Club - Missions to Seaman" in Freemantle. This has proved very encouraging for Bob who has taken $3\frac{1}{2}$ years to get to this point as he has received much help from people like Wally Swift, who has built 2 steam launches of his own. In turn this has inspired others such as Mike Adams who is actively building.

Have you ever spent a day on the river on a steam launch? It is well worth the effort. Congratulations to Bob Tanner for a job well done. Oh, by the way, who is the launch named after? Why his partner of course.

---

Australian Model Engineering

# Back Issues

| | | | |
|---|---|---|---|
| #1 | October | 1987 | $8.00* |
| #2 | November | 1987 | $8.00* |
| #3 | December | 1987 | $8.00* |
| #4 | January | 1988 | $8.00* |
| #5 | February | 1988 | $8.00* |
| #6 | March | 1988 | $8.00* |
| #7 | April | 1988 | $8.00* |
| #8 | May | 1988 | $8.00* |
| #9 | June | 1988 | $8.00* |
| #10 | July | 1988 | $8.00* |
| #11 | August | 1988 | $8.00* |
| #12 | September | 1988 | $8.00* |
| #13 | October | 1988 | $8.00* |
| #14 | November | 1988 | $5.00 |
| #15 | December | 1988 | $8.00* |
| #16 | January | 1989 | $8.00* |
| #17 | February | 1989 | $8.00* |
| #18 | March | 1989 | $5.00 |
| #19 | April | 1989 | $8.00* |
| #20 | May | 1989 | $8.00* |
| #21 | June | 1989 | $5.00 |
| #22 | July | 1989 | $8.00* |
| #23 | August | 1989 | $8.00* |
| #24 | September | 1989 | $8.00* |
| #25 | October | 1989 | $8.00* |
| #26 | November | 1989 | $5.00 |
| #27 | December | 1989 | $5.00 |
| #28 | January | 1990 | $5.00 |
| #29 | February | 1990 | $8.00* |
| #30 | March | 1990 | $5.00 |
| #31 | April | 1990 | $5.00 |
| #32 | May | 1990 | $5.00 |
| #33 | June | 1990 | $8.00* |
| #34 | July | 1990 | $8.00* |
| #35 | August | 1990 | $8.00* |
| #36 | May-June | 1991 | $6.50 |
| #37 | July-August | 1991 | $6.50 |
| #38 | Sept-Oct | 1991 | $6.50 |
| #39 | Nov-Dec | 1991 | $6.50 |
| #40 | Jan-Feb | 1991 | $8.00* |
| #41 | March-April | 1992 | $6.50 |
| #42 | May-June | 1992 | $6.50 |
| #43 | July-August | 1992 | $6.50 |
| #44 | Sept-Oct | 1992 | $6.50 |
| #45 | Nov-Dec | 1992 | $6.50 |
| #46 | Jan-Feb | 1993 | $6.50 |
| #47 | March-April | 1993 | $6.50 |
| #48 | May-June | 1993 | $6.50 |
| #49 | July-August | 1993 | $6.50 |
| #50 | Sept-Oct | 1993 | $6.50 |
| #51 | Nov-Dec | 1993 | $6.50 |
| #52 | Jan-Feb | 1994 | $6.50 |
| #53 | March-April | 1994 | $6.50 |
| #54 | May-June | 1994 | $6.50 |
| #55 | July-August | 1994 | $6.50 |
| #56 | Sept-Oct | 1994 | $6.50 |
| #57 | Nov-Dec | 1994 | $6.50 |
| #58 | Jan-Feb | 1995 | $6.50 |
| #59 | March-April | 1995 | $6.50 |
| #60 | May-June | 1995 | $6.50 |
| #61 | July-August | 1995 | $6.50 |
| #62 | Sept-Oct | 1995 | $6.50 |
| #63 | Nov-Dec | 1995 | $6.50 |
| #64 | Jan-Feb | 1996 | $7.50 |
| #65 | March-April | 1996 | $7.50 |
| #66 | May-June | 1996 | $7.50 |
| #67 | July-August | 1996 | $7.50 |
| #68 | Sept-Oct | 1996 | $7.50 |
| #69 | Nov-Dec | 1996 | $7.50 |
| #70 | Jan-Feb | 1997 | $7.50 |
| #71 | March-April | 1997 | $7.50 |
| #72 | May-June | 1997 | $7.50 |
| #73 | July-August | 1997 | $7.50 |
| #74 | Sept-Oct | 1997 | $7.50 |
| #75 | Nov-Dec | 1997 | $7.50 |
| #76 | Jan-Feb | 1998 | $7.50 |
| #77 | March-April | 1998 | $7.50 |
| #78 | May-June | 1998 | $7.50 |
| #79 | July-August | 1998 | $7.50 |
| #80 | Sept-Oct | 1998 | $7.50 |
| #81 | Nov-Dec | 1998 | $7.50 |
| #82 | Jan-Feb | 1999 | $7.50 |
| #83 | March-April | 1999 | $7.50 |
| #84 | May-June | 1999 | $7.50 |
| #85 | July-August | 1999 | $7.50 |
| #86 | Sept-Oct | 1999 | $7.50 |
| #87 | Nov-Dec | 1999 | $7.50 |
| #88 | Jan-Feb | 2000 | $7.50 |
| #89 | March-April | 2000 | $7.50 |
| #90 | May-June | 2000 | $7.50 |
| #91 | July-August | 2000 | $7.50 |
| #92 | Sept-Oct | 2000 | $7.50 |
| #93 | Nov-Dec | 2000 | $7.50 |
| #94 | Jan-Feb | 2001 | $7.50 |
| #95 | March-April | 2001 | $7.50 |
| #96 | May-June | 2001 | $7.50 |
| #97 | July-August | 2001 | $7.50 |
| #98 | Sept-Oct | 2001 | $7.50 |
| #99 | Nov-Dec | 2001 | $7.50 |
| #100 | Jan-Feb | 2002 | $7.90 |
| #101 | March-April | 2002 | $7.90 |
| #102 | May-June | 2002 | $7.90 |
| #103 | July-August | 2002 | $7.90 |
| #104 | Sept-Oct | 2002 | $7.90 |
| #105 | Nov- Dec | 2002 | $7.90 |
| #106 | Jan-Feb | 2003 | $7.90 |
| #107 | March-April | 2003 | $7.90 |
| #108 | May-June | 2003 | $7.90 |

**** These issues are A4 sized reprints***

**AME Retail**
**PO Box 1403**
**TUGGERANONG, ACT 2901**
**Ph/Fax: (02) 6292 1938**

*(If phone is unattended please leave a message and we'll get back to you)*

*Email:* **jpoliver@webone.com.au**

*Prices include GST and Postage in Australia*

***New Zealand:*** *Add A$2.00 per issue*

***Other Countries:*** *Add A$3.50 per issue*

***Note:*** *With larger orders we pass the reduced rate of postage per magazine on to you.*

# The Pennsylvania DD1

## by John Romanes

*Photos by Roger Reynolds*

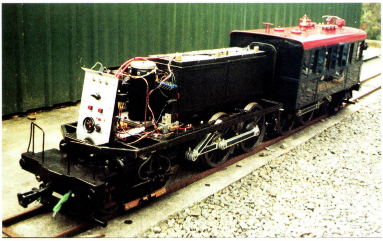
The Pennsy DD1 was developed in 1909-10 and a total of 32 of these double units were completed by the end of 1911. Designed to handle the express passenger services over the 8.8 miles (14.2km) from Manhattan Transfer in New Jersey to Pennsylvania Station in New York, through a total of six tunnels under the Hudson and East Rivers, these units operated until 1924 when newer types began to appear. By 1933 only a few were left to work empty trains to and from Penn Central to the carriage yards at Sunnyside, while 24 units were transferred to the Long Island Line where they remained in service until 1949-50.

Each section was powered by a 600v DC motor of 1,065 hp (795kW) which produced a total tractive effort of 49,400lb (220kN) at a maximum speed of 80 mph (129km/h). Using a third rail pickup system with a small pantograph to pick up the overheads in the yards, these locos were extremely powerful and very reliable.

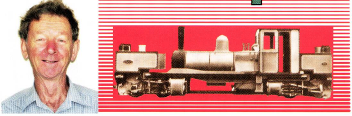
Selection of this loco as a model was driven by a desire to produce an electric that had a lot of detail and something that one could see 'going around'. So when a copy of *Live Steam* (January 1976) turned up with drawings and a description by K W Parkinson for a 5" gauge model, the project was on.

The finished 7¼" gauge model is powered by an EMD 1.2hp 24v motor and gearbox unit which chain drives one of the driving axles with the side rods carrying the drive to the other in each of the sections. Power is drawn from two 12v 130 amp/hr batteries and controlled with a 100 amp dynamic controller in each section, which gives approximately 5 hours of continuous operation at 75% discharge. This provides a unit that can operate at the railway for an 8 hour day.

Compressed air brakes on the drivers provide backup to the regenerative braking of the motors and the compressor also supplies air for the whistle. The body is aluminium, which allowed simple press tools to be made for the various window frames and dummy riveting. Main body panels are glued and bolted to the frame with the joint cover strips held on with 3M® double sided tape (very expensive but excellent adhesion properties). Some 1500 hours over an 18 month period resulted in a satisfactory model and now all that is left is to get on with some serious railroading.



# Garratt Gossip



### with John Cummings

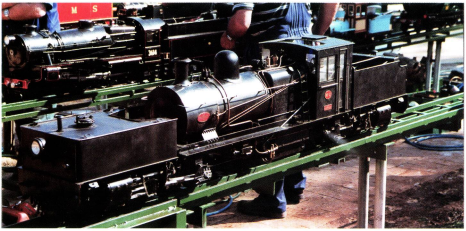
The Easter Convention has come and gone but it was an enjoyable time.

I had the pleasure of driving Keith Bradford's Australian Portland Cement 2-6-0+0-6-2 Garratt again and I finally received an invitation from Shawki Shlemon to drive his freelance Garratt. This is a story on its own. I departed from the station with a full boiler and a big fire, thinking that with a low boiler pressure that by the time I reached the hill I would have the safety valves blowing off but that wasn't to be — instead I had to get off and push this Garratt to the top of the hill where I stopped, with the blower on to build up the pressure. Once the pressure was back to normal I took off and all went well until I reached the hill only to discover that the pressure was down again, that is where I gave up and handed it back to Shawki.

That night at dinner he came to me, laughing his head off. He then told me that he had found what had been the trouble. He had designed this loco with separate reversing levers. Why! Don't ask me. Anyway, he had forgotten to set the rear engine in foreward gear. It was in mid-gear which meant the front engine was doing all the work, and the axle pump which I thought was on bypass wasn't, so this accounted for why I couldn't maintain the boiler pressure.

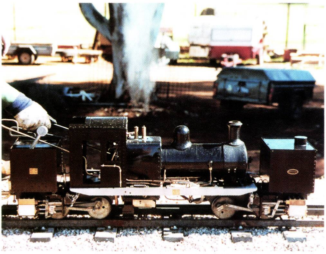
On the Illawarra Live Steamers Hot Pot weekend I meet up with Mel Skinner who had his photo album to show us the progress that he has made on his NSWGR AD60. It will be a well detailed loco when it is finished. (see issue 68 page 14).

Isn't it strange how various incidents occurr. In early May I received a phone call from Ed Mol of Canberra wanting to know where he could get drawings for either the Western Australian Railways Garratts (classes M and Ms) or the Victorian Railways Garratt (class G) which are similar, but I could not help. Then on the following Saturday my wife opened the emails to discover an email from Andrew Mottram in the Netherlands (of all places) who informed me that the drawings of the West Australian Railways Garratts (classes M and Ms) are now on microfilm at the State Library in Perth. Over 200 drawings and all on one roll. The contact person was Lise Summers (email **lsummers@liswa.wa.gov.au**), the cost was $60 but it might be a good idea to check if the price is still the same and how long it takes to get a copy made. Ed Mol mentioned that the Victorian "G" class and West Australian M and Ms were similar so I went looking in the book *Garratt Locomotives of the World.*

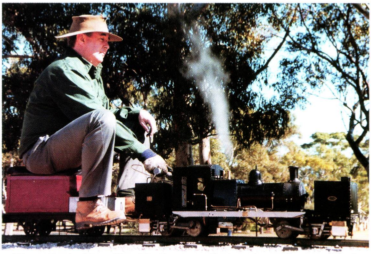


*Keith Bradford's very nice Australian Portland Cement Garratt*

*Wayne Bradford drives his father's Garratt at the Adelaide convention*



*Shawki Shlemon's 0-4-0+0-4-0 Garratt*



*Wayne Eagle drives Shawki's Garratt ... (he has plenty of steam, John!)*

The information given in this book is:

| | Victorian G | West Aust. M |
|---|---|---|
| Gauge | 2’ 6” | 3’ 6” |
| Bore x Stroke l | 3¼” x 18” | 12½” x 20” |
| Drive Wheel | 3’ 0” | 3’ 3” |
| Boiler Dia. | 5’ 0” | 4’ 10$^{13}/_{16}$” |

So there is a similarity BUT the water tanks on the “G” seem to be higher that the “M” and the cab on the “M” is open but closed in on the “G” going by the photos that I have seen in this book I have also had an email from a chap in Melbourne who is building a Tasmanian “K” in 45 mm. He mentioned a book titled *K1 1st Garratt in Tasmania* written by Dr. Christian Cenac. This chap writes as follows:

“I got it from Plough Book Sales. It is expensive at $170 but it is an excellent book which covers not only the K1 and K2 but a few other loco’s used by the Tasmanian Government Railways plus the rolling stock and the buildings on the line. The book comes with a complete set of drawings all to 1:19 scale (16mm to the foot). The drawings cover all the engines and the rolling stock, they are fantastic. The book alone is not worth the $170 I paid, but the drawing set is !”

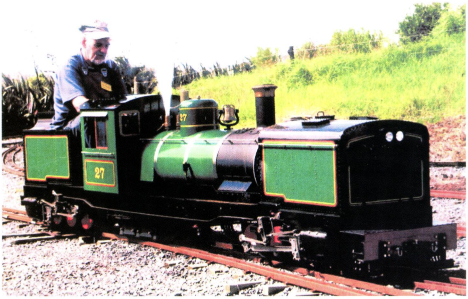
I have seen this book some years ago (but did not buy it) and I agree about the drawings, they are excellent.

Another thing brought to my attention, I may have given readers the wrong impression in the last *Garratt Gossip* issue 108 when I mentioned that the “K” class drawings are all on one roll BUT the L, M, G, Q and R classes are on a separate roll. The L and M class were Garratt’s while the G, Q, and R classes were standard locomotives. My apologies.

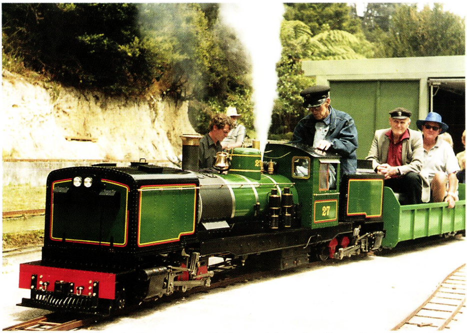
Has any reader contacted those South African email addresses that I published regarding drawings of South African Garratt’s in *Garratt Gossip* issue 106. If so what was your result? Please let me know as Bryan Brinkman of South Africa, who sent me these email address’s, would like to know what results you achieved.

In New Zealand, a few years back Harold Sinclair, who is well known as a builder of large 7$^1/_4$" gauge engines decided to build a Garratt based on a 24" gauge type for a change. As Harold’s health began to decline when he was about 75% through the project Paul Newton took it to completion. Max Kempson of Kapiti Miniature Railway and Dave Giles of Manukau Live Steamers have both sent some photos for you to enjoy.

As I write the final words for this *Garratt Gossip* my copy of the latest *AME* has arrived and on glancing through it I spotted a photo of Wayne Roberts driving Alf Bond’s BIG diesel. Well! At the convention I was informed that Wayne was intending to build a Garratt. Which one I don’t know BUT I am beginning to think that the Lake Macquarie boys may have talked him into approaching a member in their club who has built a 7$^1/_4$" gauge **diesel** Garratt. The mind just boggles.



*Paul Newton takes the Garratt on its test run at Whangarei Miniature Railway* Photo: Mike Orange



*Harold Sinclair drives the Garratt at the Maidstone club track at Upper Hutt* Photo: Max Kempson

*Another shot of Harold driving at the Maidstone MES track* Photo: Max Kempson

# Role and Function of Rail Head Radius in 5" and 7¼" Gauge Track

### by Henry Pattenden

## Introduction

Recent correspondence in *AME* on the need or otherwise for rail head radius for 5" and 7¼" gauges has focused on wear characteristics, rather than on its primary role in inter-reacting with the wheel root radius. The following treatise examines the need and function of rail head radius and finds it to be significant.

Several years ago I had cause to examine AALS Track and Wheel Standards quite closely and was surprised that only the narrow gauge specifications have provision for rail head radius. This despite corners of "flat bar" rails encroach the wheel root radius area in both Fine Scale Standards.

Having spent a significant portion of my working life as a technical trouble shooter, I have developed great respect for getting back to basic principles when examining cause and effect.

I have also developed great respect of our forebears, who initially developed most of the Standards we take for granted nowadays. The inter-action of a rolling flanged wheel on fixed rails was well understood early last century.

So let's apply some of those basic principles to this inter-action as it applies to AALS 7¼" Fine Scale, Track and Wheel Profile Standards.

Note: CAD has been used, as it is a marvellous tool for the purpose and makes playing "what if's" a breeze.

## Technical appraisal

**Fig 1** shows the salient features of the wheel and track profiles and the inset shows the intrusion of the rail corner into the wheel root radius. That this seems to work satisfactorily in practice is not in dispute, however it does seem a less-than-ideal situation.

**Fig 2** shows a chamfer, similar to that made by Robert Elliston (*Letter Box*), however its the 2mm dimension is measured across the corner of the rail as it suits the purpose of this exercise. If Robert's chamfer is a full 2mm x 2mm x 45° as reported in his letter, he may be in a spot of trouble as will be seen later.

The corner of the rail head now clears the wheel root radius but introduces another complication. When side thrust is applied to the axle, the wheel will lift only a very small amount before the flange strikes the lower aris of the chamfer, so negating the whole purpose of the wheel root radius. To be viable it needs further work!

**Fig 3** shows additional 'bevels' ground on the upper and vertical surfaces of the rail to approximate the radius he seeks. This is simply application of a process we all do in making a radius in thin material; mark out the required curve and cut off the waste at 45°, then cut off the two remaining peaks and dress up with a file or grinder.

The profile is now a close fit to a radius of 2.4mm, which in turn, is very close to the wheel root radius. If the operation is accurately carried out, the remaining peaks would only stand about 0.05 mm above the theoretical radius, hence should be quite viable in service. However because of its closeness to the wheel root radius, its action is hard to predict.

So what is the function of the wheel root radius? Why can't we have "cotton wheel" type flanges and let it abut the inside edge of the running rail, where it cannot go any further?

The answer is in stability and its effect on ride quality, wear, etc.

The wheel root radius is very special extension of the tyre taper. It is designed to damp lateral wheel set oscillation and make for smooth running.

As an aside: Several years ago, I travelled on The Cumbres and Toltec Railway in the USA and was allocated a seat in the first carriage behind the locomotive, in full view of the rear axle of the tender. At times the lateral oscillation of that axle bordered being alarming and I would guess sections of that line were badly out of gauge. However, it did serve to show the function of the wheel root radius

**Fig 4** shows the wheel and rail in its neutral position. The rail is shown with a small radius to illustrate the effect of lateral loading in subsequent diagrams. We will try to optimize this rail head radius later.

In that neutral position (i.e. the wheel flanges equidistant from the rails), it shows that nearly all loading is in the vertical plane with only slight self-centring action, (i.e. little lateral damping).

**Fig 5** shows the effect of lateral thrust due to centrifugal action on curves. The wheel rides higher and the point of contact shifts around the wheel root radius and resistance to the thrust is increased as reflected in the associated vector diagram, (i.e. increased lateral damping). We will assume for now the vertical load on the wheel remains constant.

**Fig 6** shows the effect of further lateral thrust to the point where the point of contact is at the junction of the wheel root radius and the front flange angle. Again this increase in thrust resistance is reflected in the associated vector diagram and it is at this point resistance to side thrust is at a maximum, (i.e. maximum lateral damping).

In practice, wheel dynamics cause the wheel set to oscillate or hunt to balance these forces.

As can be seen, derailment due to side thrust alone is extremely unlikely. Depending of the height of its centre of gravity above rail level, the vehicle is likely to topple over first.

Note: There are other dynamic forces at work, such as possible ability of the flange of the rotating wheel to climb the rail, but are ignored in this analysis.

These diagrams confirm the desirability of a rail head radius and show why it must be significantly less than the wheel root radius. A square edge to the running rail simply means that this radius has been reduced to zero and the wheel must lift higher to achieve the same result.

This might give a pointer to the apparent success of the "flat tread" brigade, as with no rail head radius one wheel is always running on the wheel root radius and there is little dynamic change as the wheel tread itself makes little or no contribution to stable operation.

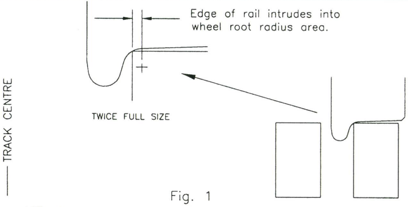
OK, now what's the effect of too large a rail head radius?

**Fig 7** shows a grossly oversize radius just to make the point clear. There is little resistance to lateral thrust hence the wheel flange taper come into contact with the rail head radius very early. Additionally with the rail head radius and wheel flange radius perilously close together, there is potential for the ramping effect of both these radii to lift the wheel (the wheel is turning don't forget), when its resistance to side thrust will be further reduced. There is real potential for the wheel to simply climb the rail and once the process starts there is no mechanism to stop it. Whoops and you're off.

So what is the optimum rail head radius? Instinctively I would suggest about 70% of the wheel root radius and certainly large enough for its tangent point at the rail head to be near the run-out of the wheel root radius and the tread face, so as to minimise wear

But hang on! Many Club tracks are dual gauge, so perhaps this rail head radius should also be compatible with 5" Track and Wheel Standards. Now 70% of 1.8mm radius is 1.25mm, which is a lot less than I would have expected when I started this analysis, so is it reasonable?

Out in the shed I have a short section of 80lb rail (makes a pretty handy anvil), and a rough check shows the rail head radius to be approx 12mm, i.e. 10 times larger. Yep, sounds pretty reasonable to me.

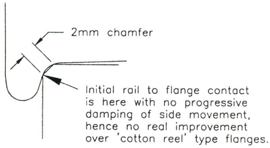


Edge of rail intrudes into wheel root radius area.

Fig. 1

7¼" FINE SCALE TRACK AND WHEEL STANDARDS

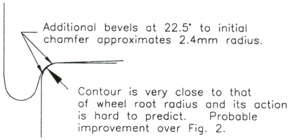
FULL SIZE



Initial rail to flange contact is here with no progressive damping of side movement, hence no real improvement over 'cotton reel' type flanges.

Fig. 2

2mm CHAMFER

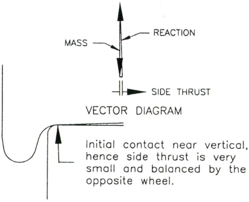


Additional bevels at 22.5° to initial chamfer approximates 2.4mm radius.

Contour is very close to that of wheel root radius and its action is hard to predict. Probable improvement over Fig. 2.

Fig. 3

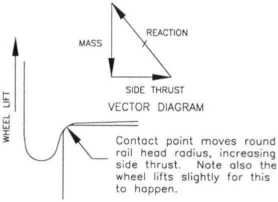
CHAMFER BLENDED TO A RADIUS



Initial contact near vertical, hence side thrust is very small and balanced by the opposite wheel.

Fig. 4

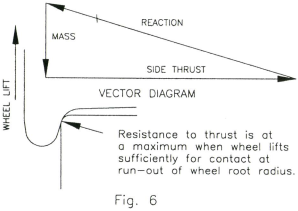
WHEEL ON STRAIGHT TRACK



Contact point moves round rail head radius, increasing side thrust. Note also the wheel lifts slightly for this to happen.

Fig. 5

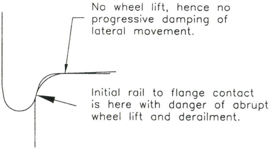
INITIAL THRUST DUE TO CURVE



Resistance to thrust is at a maximum when wheel lifts sufficiently for contact at run-out of wheel root radius.

Fig. 6

MAXIMUM RESISTANCE TO THRUST



No wheel lift, hence no progressive damping of lateral movement.

Initial rail to flange contact is here with danger of abrupt wheel lift and derailment.

Fig. 7

RAIL HEAD RADIUS TOO LARGE

H.J.Pattenden May 2003

To be functional, this rail head radius needs a tolerance and I would suggest it be the high side of what is a pretty small dimension, hence 1.2 - 1.5mm. The latter being about 83% of the 5" gauge wheel root radius. If 7¼" gauge only is a consideration, the equivalent range would be 1.7 - 2.0mm radius.

By now the wisdom of accepting "flat bar" rails in smaller gauges becomes apparent. Being hot rolled, it will not, indeed cannot, have a perfectly sharp edge. The rounding that does occur, softens the interaction between the inside corner and the wheel, and also allows the wheel root radius perform its primary task of damping lateral oscillation. However I would suggest that this minimum radius is simply tolerated, rather than being a preferred parameter.

A significant trade-off in accepting standard "flat bar" rails is that the wheel must lift significantly (about 2mm in 7¼" gauge) before maximum lateral control is realised, while with an optimum rail head radius it would be less than half this. This alone, is not sufficient reason to condemn the practice.

This leads to an interesting dichotomy. Why does the AALS 7¼" Fine Scale Track Standard have no rail head radius while the AALS 7¼" Narrow Gauge Track Standard specifies 2-3mm, when the wheel root radii differ by only 0.5mm?

I am pretty sure I know why, simply because of previous examination the Standards when investigating the compatibility of the four 5" and 7¼" standards, but I will spare you the detail for now.

Additionally, the provision of rail head radius allows more lateral movement of the wheel set, which may or may not be a good idea. Again I do not intend going into detail, but it serves to show changing one parameter can impact on others.

By now this whole issue is becoming quite complex, but there are two more issues we might examine before we go further. The need for wheel lift in providing lateral damping and the desirability for and role of transition curves.

Wheel lift may initially seem undesirable, but is simply the mechanism by which the energy due to side thrust is absorbed. Additionally it is the energy source (mass x height) which restores neutral operation, more likely, gentle oscillation, of the wheel set when the track straightens again.

This action is aided by the use of transition curves, where the wheel/rail contact point moves smoothly around the rail head radius until the external forces are balanced out. The transition is not simply a smooth decrease in track radius in the geometrical sense, it is also provides smooth transition of forces as the wheel set progresses around the curve.

All this facilitated by a *seemingly insignificant* rail head radius!

Now, if we can agree that rail head radius is desirable and that this must necessarily be fairly small, how best do we achieve it? Grinding is the obvious answer, but three passes? I doubt its practical in 5" gauge; the first 45° pass would need to create a bevel only 1mm wide, whilst the other two would be very light skims, requiring very accurate guidance of the jig/carriage (or whatever) of the grinder. This would be more easily achieved in 7¼" gauge where the initial bevel would be about 1.5mm wide.

From a personal viewpoint; if I were to construct 5" gauge track for my own use (unlikely), I would incorporate rail head radius even if I had to hand file each rail before assembly. It would offend my engineering instincts not to.

Conversely, if I were to build a steam locomotive (equally unlikely), I wouldn't let "as rolled" rails deter me from enjoying the fruits of my labour. However, I would suggest that those who might wish to build or commission larger designs where mass is a major factor, take careful account of the tracks they intend to use.

Example: The smallest locomotive at the recent AALS Convention was a Northumbrian 0-2-2 (*Rocket* type), while the largest was a South African 2-10-4 with long fixed wheelbase. Hence dynamic inter-reaction of wheels and track would be very different. I would think rail head radius would simply be a design nicety to the former because of its low mass, yet a significant aid to smooth operation of the latter.

## Summary

a. The AALS seems to be ambivalent about the need for rail head radius, yet its inter-reaction with the wheel root radius is an important part of operational stability.

b. For optimum operation, this radius needs to be continuous curve. A simple chamfer does not fulfil the required function.

c. The radius itself can be quite small, but not so small that the "as rolled" edge of the rail offers anything like optimum results.

d. An effective radius can be incorporated into existing track, but requires considerable determination and care. The key to this, is the word 'continuous', absolute accuracy is not as important as a smooth rounded surface.

e. The chamfer referred to in Robert Elliston's letter, Issue 108, appears to be at the very outer limit of that which may be turned into a functional radius. Very great care will be needed in any rework required to provide the continuous curve referred to above.

f. With increasing use of dual gauge track, (virtually mandatory for hosting of the annual AALS Convention), reference to "AALS Standards" is a nonsense, as the four "Standards" have little in common dimensionally. It seems odd that the AALS has not documented a set of 'best practice' parameters for the benefit of host clubs.

g. Now that metrication has been with us for over 20 years, perhaps it is time that track and wheel standards were issued in practical metric units only, leaving original imperial standards on file for historical reasons.

## Recommendations

Strictly speaking, I am not in the position to make proper recommendations, so I respectfully suggest the following:

1. Robert Elliston and his Club make cardboard templates of their wheel and track head profiles (4 or 5 times full size) and use these in conjunction with the above analysis, to come to their own conclusions as to where they might go from here.
2. AALS convene a Technical Committee to rationalize Track and Wheel Standards in purely metric terms and in turn, document how these can be best incorporated in Dual Gauge (5" and 7¼") track.

Incidentally, the terms 5" and 7¼" gauge do not offend me in the least, its simply that practical metric measurements are so much more convenient nowadays.

*This article was submitted as a result of the debate in the last couple of issues about rail head radius. Because of the length and the detail involved I decided to print it as a separate article. There is more on this debate in the Letter Box section ... dp.*

## Handy Hint

### Fine silver soldering

Recently I had to do some very fine silver soldering on the handrails of a friend's locomotive. I filed some silver solder into a small dish and mixed it with some flux. I then painted it onto the parts that I had to solder together, applied some heat, and presto, she works.

***— Gerardus***

## Understanding Engineers

**Take 1** — To the optimist the glass is half full. To the pessimist, the glass is half empty. To the engineer, the glass is twice as big as it needs to be.

**Take 2** — Normal people believe that if it ain't broke, don't fix it. Engineers believe that if it ain't broke it doesn't have enough features yet.

**Take 3** — What is the difference between Mechanical Engineers and Civil Engineers? Mechanical Engineers build weapons; Civil Engineers build targets.

## A Couple of Quotes

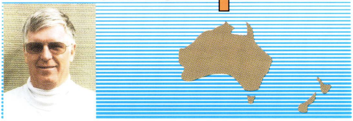
There isn't a train I wouldn't take, no matter where it's going

***— Edna St. Vincent Millay***

I have seldom heard a train go by and not wished I was on it

***— Paul Theroux***

# Club Roundup



### with Gerardus

## Auckland, NZ

At the May meeting, Mike Jack had the flanged pieces with formers for his firebox on display. One was milled from mild steel, slit part way through in two places, then bent to the required shape. Plates were then welded across the slits to hold everything solid while the copper plate was beaten into shape over it. A simple way of making a former! Allan Roberts had a diffuser out of one of his gas turbine engines. It had experienced a quick trip around his workshop after parting company with the lathe chuck. Needless to say, it wasn't in as pristine a condition and certainly was not able to be reconditioned. It's a bugger when something like that happens, especially when the part is almost finished!

***Auckland Society of Model Engineers***
***Location:*** *Petersen Road Reserve, Waipuna Road, Panmure*
***Public Running:*** *Every Sunday*

## Bendigo, Vic

Our 5th national exhibition was an outstanding success and exceeded all our expectations. We wish to thank all Exhibitors for exhibiting, coming from all over Victoria, Interstate, and as far away as the Gold Coast. We thank all the public for supporting us with their attendance through the door. A big thank you to our generous sponsors for their support also. As we are a very small club with only 13 members. We take this opportunity in thanking all our members and their ladies for all they put in to get the expo up and running. It was great to renew old acquaintances and make new ones. We will now be concentrating on the proposal for our new multi gauge track.

***Bendigo Society of Model Engineers***
*Our mailing address is secretary: R.E Hayward, PO Box 6, Long Gully Vic 3550*

## Blenheim, NZ

The Committee plans to produce a Procedures Manual for implementing new rules. This will include driver licensing, registers of locomotives and carriages, etc. We trust this will keep us aligned with other engineering societies in NZ and work towards a safer environment where operations of miniature trains and public are concerned.

A trip was made to Dunedin for the opening of the John Rappard's Signal Hill Railway. After unloading, we first walked around the track to inspect it before proceeding to steam up. The line features viaducts and trestle bridges (some 3 metres above ground level), 5" and $7^{1}/_{4}$" gauges and a ruling grade of 1 in 80. By clever use of a crossover and points it is possible to run some 1100 metres non stop. The track is divided into sections by simple signals which are essential to use because with limited visibility as the track winds through heavy bush, collisions could occur.

The Aero section had some lovely flying days over the past couple of months with excellent turnouts by both members and a few visitors. The highlight was a 'float fly-in' at Lake Argyle on May 4, and there was plenty of excitement. The new *Sea Hawk*, flown successfully on wheels the week before, had floats fitted for its first flight. Things did not go to plan, however, but fortunately the aeroplane was not too badly damaged unlike the owner's pride.

***Marlborough Assoc. Modellers Soc. Inc***
***Location****: Brayshaw Park, Blenheim*
***Public Running****: 1st Sunday*

## Bulla, Vic

The Council is proceeding with the public picnic area and playground between the Tennis Club and our new station building, and they have been asked that our perimeter fence be re-located to allow proper access for our (yet to be completed) foot bridge which in turn gives access to our private picnic area.

Our last Planting Day saw the planting out of another 200 or so plants, as we continue to beautify the area. Because we are so near the airport our various trees must not attract birds that could cause disruptions in a plane's flight path.

To resounding cheers it was advised that the last brick has finally been laid in the station. Work on the bridge beams is also progressing, and the materials are mounting up in readiness.

Alf Harder brought along all the electrical bits and pieces, details, and instructions for the signals and points. These have been designed to be simple to use and maintain and to be as trouble free as possible. The control posts can be removed, and the 'guts' are to be placed in a metal canister, to be buried underground. Murphy-proofed!

The project of filling in the compound area — almost to the boundary fence line and right up to the public area of the track has progressed in leaps and bounds due to the availability of the filling material. To date, over 6000 cubic metres of fill has been used, involving 177 truck and dogs. As the fill is coming from a large earth working business advice as to the retaining and packing of the material was also available, and this has turned out to be simpler than expected.

***Tullamarine Live Steam Society***
***Location****: 15 Green Street, Bulla*
***Public Running****: 1st & 3rd Sundays*

## Burnaby, BC Canada

The track came to life at Easter, for another season, our 10th year at the Confederation Park site. The major event that has happenned at the track has been the near-completion of the new canopy over the platform. It has taken much work to get the foundations and drainage pipes in place before the wider platform area could be covered in concrete. We are now ready for that occasional shower or the long hot days of summer. It is a very nice addition to our railway.

Work has started on colour light signals, and electric point machines to power our important facing points. The club purchased many car door-lock electric motors to do the job. The first one installed, on the entrance to the westbound platform for tracks 3 and 4, has been in use right through winter and has survived well. Interlocking circuitry is to be designed so that the points can't be changed if a train is already going through.

The club's Hudson loco is getting a new Briggs steel boiler. Recently, the copper heat exchanger, Kaowool® insulation, stainless steel co-axial superheaters and a teflon ball valve have been fitted. The boiler has 36 x $\frac{1}{2}$" tubes and 6 x 1" superheater flues.

***British Columbia Society of Model Engineers***
***Location****: Rainbow Creek Station, 120 Nth Willingdon Ave, Burnaby, BC.*
***Public Running****: Saturday, Sunday & public holidays, Easter to Thanksgiving*

## Christchurch, NZ

After almost six years of frustration and disappointment, we now have Resource Consent, and a Building Permit for our engine shed! Over the last few Saturdays, members have been busy screwing 850 meters of prefabricated track on to 2550 sleepers. Another 1500 steel sleepers have been cut and are awaiting volunteers to drill three holes to allow more track to be made in the coming months.

In the boat section, there has been some great weather this season and good support by members sailing on the pond for Sunday birthday parties. Phil Robinson's IC boat attracts people to watch.

***Canterbury Soc of Model & Experimental Engineers***
**Location***: 26 Andrews Cres, Christchurch*
***Public Running****: 1st & 3rd Sundays*

## Duranbah, NSW

Probably one of the smallest clubs in the Association, having only 13 members and 9 locomotives, our track is located on a man-made island within the Tropical Fruit World Complex in the beautiful Tweed Valley, situated on the far north coast of NSW. The island is covered in trees and sub-tropical growth. Our track is 7¼" gauge and is approximately one kilometre long with passing loops to allow for the tourist train operated by the complex to pass at all times without interruption. We do not haul the paying public as we are essentially a hobby club. Unfortunately, there is no power to the island and all track work is done with the use of a generator. The track is owned by the complex and it is our job as a club to supply the complex with the labour for maintaining it.

A warm welcome is extended to members of other clubs to visit with us, whether you have a locomotive or not, and if you decide to do so, please contact Stan Kirk on (07) 5524 5444 to make arrangements.

***Tweed Valley Miniature Steam Railway***
***Location**: Tropical Fruit World Complex, Duranbah.*
***Running days**: 2nd/ 4th Sundays, no public*

## Durban, RSA

At the April meeting, the proposed 7¼" gauge track was discussed and a rough layout of the track was drawn up, presented and agreed upon, subject to one change. Fencing the track to prevent people getting in the way of a train was also discussed — one or two footbridges over the track will probably be required. The recommended minimum radius of 60 feet cannot be used but one of 50 feet can and will most likely be adopted. It is intended to alter the rough layout and peg the track out on the ground before the final design is done.

A lot of contact has been made with the newspapers and "What's On…" to lift our profile to the public. This has had some success as several people at the last public running day said that they had seen the advert. At the members' private running day, Jimmy Ingram was able to sort out the valve timing on *Speedy*. Dave Rose serviced our party workhorse, *Rosie*, while the rest of us repaired gates and fences.

***Durban Society of Model Engineers***
***Location**: Kellaway Hall, 10 Hinton Grove, Virginia*
***Public Running**: 2nd Sunday*

## Eltham, Vic

Following the closing of tenders the builder has been selected for the new B Signal Box and work should commence late July. A target opening date of 24 June 2004 has been set for the new Signal Box to coincide with the 20th anniversary of the opening of Pine Creek Extension. These new facilities together with the placement of a number of signals on gantries and conversion of points and signals in the Diamond Valley Station area to air operation, comprise a major upgrade of the Signal and Telegraph infrastructure.

All but the Guards car in the RPC set have now been repainted in *Spirit of Progress* colours and they look great behind S301. The set should be complete with the recontoured Guards Car outshopped shortly. Our July steam day saw the Heritage Goods Fleet, complete with the newly refurbished Hopper Wagon, do a few circuits behind G527 for the excellent crowd that turned out on a lovely sunny winter's day. The steamers were also the focus of much attention for the day with *Coolum*, an 0-6-0 tank modeled on a sugar cane loco, back in passenger operations, after major repairs and overhaul. *Coolum* double-headed with *Helga* an 0-4-2 modeled on a German industrial locomotive.

Rerailing of the express road 1A through Diamond Valley Station together with the points at each end, which provide the loop through Platform 1, was completed in time for July school holiday running. Trackwork activity is currently focused on replacing several 14lb panels suffering from poor rail and bad joints. A proposal to construct a new underground storage facility adjacent to the small tunnel has been approved. This is to be a 7-road storage beneath the earthen embankment and will be constructed by cut and cover. This new facility, together with the later rebuilding of the present carriage shed to an improved standard, will provide relief to the present limitations on storage.

***Diamond Valley Railway Inc***
***Location**: Eltham Lower Park, Main Rd, Eltham*
***Public Running**: Every Sun & public hol.*

## Evandale, Tas

Since the last club notes appeared we have had much rain and the ponds are full again making our track much more scenic. Unfortunately this has also meant much grass to be mowed with our new ride-on mower. We have had an infestation of a noxious pond-weed and this has taken some time to remove (we doubt we will actually eradicate it!).

The kiosk has been shifted away from the trees (it was being pushed sideways!). Having done the shift we are not happy with its present location and we will be shifting it again in the near future. The first shift was done with trolley jacks, industrial rollers, planks, a car trailer and many people, the next time it will be done with a hired crane and few people! The picket fence around the steaming bays has been reinstated after the shift and has made the steaming bay area much more open.

An Invitation Day and Swap Meet will held on the last weekend in September (27-28). There will be a Swap Meet and Invitation Run on the Saturday (open to the public for 7 25" rides) followed by the normal Public Running day on the Sunday plus the Swap Meet on site as well. The "Drive the Loco" HO gauge layout is to be set up for that weekend for the young and young at heart.

We again repeat the news that we will NOT have to shift in the foreseeable future.

***Evandale Light Railway & Steam Soc Inc***
***Location**: Rear of Falls Park, Evandale*
***Public Running**: 2nd & last Sundays*

## Fairfield, NSW

The WDLS clubrooms have been receiving considerable attention — we have sectioned off a meeting room from the work area within the building with a new wall, lining the meeting room ceiling and walls, a new raised area over the storage tracks has increased space. New lights and a coat of paint have done wonders. Our planning has started on a new through yard trackage to hold rolling stock, easily accessible from the turntable area. Another major feat finished was replacing a part of our retaining wall in the cutting. The new native bushland garden is progressing well and with the laying of new irrigation piping to the cutting, we are hoping that the natural tunnel will take off after the long dry spell. The centre picnic area has also seen considerable work with a new mesh fence erected.

***Western Districts Live Steamers Co-op Ltd***
***Location**: Fairfield City Showground, Smithfield Road, Canley Vale*
***Public Running**: Every Saturday Feb - mid Dec (Club day 3rd Sunday)*

## Galston, NSW

With the return of cooler weather, our March and April running days were very busy indeed. The long dry spell that has caused so much concern has now broken and the site is looking much better! A number of badly stressed trees have now recovered.

In March, we held a 'Trains Operations' day with the aim of running 25 train operations over a 140 minute period. This required 10 locomotives capable of heavy freight duties and express passenger hauling, with 5 to 6 light locomotives for yard and pilot duties. Four mainline and one yard locomotive withdrew which resulted in the Operations Manager revamping the operations sheet on the Saturday morning. The train running eventually got underway at 12:15pm, 75 mins late! Again, fate took a hand and the round-house roster clerk "lost" two locos at the last minute, one wanting water and the other having crib in Wattle Siding. Now we were another 20 minutes late and our rather frustrated Operations Manager again compromised and with the help of the Galston Valley Goods Yard Staff, got the empty coal train away. Other 'gentlemen' with kind words, got the Galston Valley Passenger Yard locos working and made up express and local passenger trains and sent them on their way. Meanwhile, up in Martinsville, the two yard masters were wondering where their trains were. Alas, with little locomotive power, none were available. A slight misreading of the Operations Sheet saw a heavy coal train (empty) in Banksia Siding. A local passenger train, running tender first, stopped on the mainline thus blocking an express passenger leaving Dainton and Martinville crossover: "Oh well, the life of a railway man isn't easy"! Eventually calm descended and things began to improve. Alas: the lack of motive power, not helped by an engine failure and one not steaming well, saw the operations manager call a halt around 2:45pm. Lots of valuable data was collected and we intend to rewrite some areas and alter others.

***Hornsby Model Engineers Co-op Ltd***
***Location**: 29 Mid Dural Road, Galston*
***Public Running**: 2nd Sunday*

## Gosford, NSW

Progress has been made on the two walls on either side of the dish drain behind the bottom steaming bay. These walls will soon carry the bridge over the drain to provide public access as well as the unloading ramp for the steaming bay.

We'll have an arch on almost every bridge around the track if Allan Fogarty has his way. He's almost finished an arch over the culvert near the top steaming bay and has already cut the steel for the little bridge over the culvert off the end of the trestle and before anyone asks he has cut enough steel to do both sides of this one — after all it is dual gauge.

It was good to see another new loco from the Brack workshops undergoing a steam trial at the May running day in the form of Leal's new 7¼" Gauge 0-4-0. Some of us are still trying to figure out why a steam loco needs a 12 volt battery though when it's moving.

Whilst on the subject of running days the April Running Day was extremely well patronised. The May running day was not without a few problems the first being the failure of a hydraulic line on the club loco which caused a few early problems. On top of this we suffered some minor vandalism with stones being jammed between the rails on some of the dual gauge track and some of the point levers being bent and damaged. Fortunately the repairs were done immediately and this had very little effect on the running day.

We were also able to make better use out of the trackage through the station by using the dual gauge to its full extent for both gauges and in so doing we were able to provide through running for the party trains in the afternoon.

As a result of the vandalism that took place prior to the May running day and other incidents of graffiti attacks etc. the Police who have agreed to conduct after hour's patrols as a deterent.

***Central Coast Steam Model Co-op Ltd***
***Location**: Lot 10 Showground Rd, Narara*
***Public Running**: 1st Saturday*

## Invercargill, NZ

Twenty-five members attended the 2003 Annual Meeting in May. Peter Stark has resigned as secretary, after ten years of taking minutes and writing letters. Peter Metcalfe was elected President and Barrie Sinclair is Treasurer. The secretary's position remains to be filled. The President's Trophy was presented to Frances Gibbs for her work in maintaining the gardens around our grounds.

Members are busy in all sorts of activities — some are involved with the machining and construction of a full size *Lady Barkly* steam locomotive replica, which will be a static display. The original was the first steam locomotive to enter service in New Zealand.

***Southland Soc of Model Engineers Inc***
***Location**: Surrey Park, Invercargill*
***Public Running**: None*

## Mangere, NZ

There was plenty of action at the last MLS working bee as one ton of steel rail was delivered, unloaded and neatly stacked into the storage container. The next job is to collect the one ton of char to be stacked away in the storage bin. The 5 inch rails in the cross-over at the entry yard received some attention, graffiti was painted out and a few other jobs completed.

Several live steamers took a trip to visit Maurice and Ellery's property at Kawhia to inspect progress on the new 7¼" gauge railway they are currently building. The track is being built in a valley which looks out over the Kawhia Harbour. The site is being developed like a native park with many ferns, shrubs and trees being blended around the railway. After the site inspection around the railway, it was time to steam up the 2-6-0 Mogul and put it through its paces. This loco, a Keith Watson design, has a Briggs boiler and is fitted with Walschaerts valve gear. The gradients on the finished section of the railway are about 1 in 30. With a bit of sand, the loco charged up the track with ease. Earth works have now been completed using a hydraulic digger and a vibrating roller is being used to consolidate the base ballast before the track is laid. The track is "T" section as described in *AME*, laid onto 100 x 50mm sleepers, 500mm long. About 200 meters of track has been finished at this stage and the railway will be around 900 metres long when completed.

***Manukau Live Steamers Inc***
***Location**: Mangere Centre Park, Robertson Road, Mangere*
***Public Running**: Every Sunday*

## Maryborough, Qld

Life member Bob Lisle was named Maryborough's Australian Citizen of the Year, at the Australia Day celebrations. Becoming a paraplegic due to a logging accident in 1948, Bob went on to start his own foundry in Gympie, where he worked for 13 years. Relocating to Brisbane, he provided invaluable service in the field of engineering. In 1980, he retired to Maryborough and went on to complete five miniature steam locomotives — four PB15's and a C17. He is also the club's AMBSC boiler inspector and has served as MELSA Maryborough President for eight years and Vice President for another eight. Bob is a shining example to all who know him, a truly remarkable man!

Some of the recently completed projects in the club are Des Rowland's 5" gauge QR A12 (first steamed in March) and Alan Houston's 3½" gauge *KATIE*. This started life as a large boilered NER Atlantic 4-4-2 to LBSC's 'Maisie' design but has metamorphosed into a lovely freelance loco reminiscent to the VR "K" class with smoke deflectors, headlight and painted in gloss black.

***Model Engineers & Live Steamers Assoc, Maryborough***
***Location**: Queens Park, Maryborough*
***Public Running**: Last Sunday*

## Melbourne, Vic

To start off I must apolgise for no club report in the last issue. You know what it's like, you get a busy spell and the next minute you realise you've missed the publishing deadline. Quite a few things have happened since I last reported. In

*At this year's Barcaldine Steam Fest in central Queensland were (from left) Bob Kimber (MELSA Maryborough), Greg Soper (Mackay SME), Dale Smith (Barcaldine, also a MELSA member) and Graham Jenkinson (Mackay SME)* Photo: courtesy of The Longreach Leader an earlier meeting we had Matthew, a guest speaker, who presented a history on the development of the Melbourne made Thompson steam car. After this, models on the table comprised of two steam car engines provided by Dave and David allowing members and visitors to get a better appreciation of their size and construction. Also on that night Geoff showed off his handy work at making a sundial from plans in a recent issue of *Model Engineer* magazine. Other items of interest were Ray's lens adapter to suit a Nikon camera, Stan's construction of lamps to suit locos, an edge finder by Trevor and Gary's London-made BTM watch makers lathe.

Next month saw another guest speaker Brian, who is a lecturer at Monash University. He presented an informative over view on one of engineering's biggest curses, RUST, or to use the right term corrosion. He concentrated on the causes and methods used to reduce it, as well as some enlightening case studies. After this it was the normal models on the table followed by tea and coffees.

Last month saw the annual rotation of stock between the club members. It was the annual Auction night, where a lot of last year's purchases go under the hammer again and move to a new loving home. A fun night is had by all, with some good bargains to boot. Even the club president I think slipped in a few puchases while his wife wasn't watching (sorry Rob).

As I'm writing this I have just come back from a great weekend at the Bendigo Model Engineering Exhibition. Where a dedicated group of our club members attended and displayed their models. Thanks to all, as without your efforts it would be difficult to put on a display that represents our club. Also thanks to the Bendigo club for their hospitality and I'll definitely be back for the next exhibition.

***Melbourne Society of Model & Experimental Engineers***
***Meetings:*** *92 Wills St., Glen Iris. 2nd Friday, 8pm*

## Millswood, SA

A couple of 'lost locos' have returned to Millswood — the first is a 5" gauge *Nigel Gresley* built by Bert Francis twenty years ago. Rodney Harris has recently purchased this loco. The other is a freelance 5" gauge loco which belonged to the late Fred Hercus (see *AME* Nov 87 page 19). A photo on the display wall in the clubhouse shows Fred driving his loco in the early 70s. From then until now its existence remained a mystery. Recently Glen Templeman uncovered the whereabouts of the locomotive and he has now purchased it.

Due to excessive weed growth and mud, operation of boats could no longer cope with the fouling of propellers, hence the decision was made to drain and clean the pond. Barry Dunstan made an 8 foot wide "Dozer" to drag the weeds and mud to one side whilst Doug Wallace has made a smaller version for spot working. A contractor was engaged to vacuum the weed and sludge from the pond. The boat harbour was also thoroughly cleaned out. Quite a large number of full briquettes, chunks of railway ballast and other items were found. So it does makes sense when the newsletter says that SASMEE has a "POOL" of some 30 locomotives!!!

***South Australian Soc of Model & Exp. Engineers***
***Location:*** *off Millswood Cres, Millswood*
***Public Running:*** *1st Sunday, 3rd Saturday*

## Moorabbin, Vic

In April, we ran for the Pied Piper's playgroup with about 50 children and 25 adults In May, we ran twice for the Langwarrin Park school for a total of about 55 children and 20 adults. On our Kindred Societies Day in May, we had a great turnout of visitors and members with 107 names recorded in the attendance book. There were 17 locos for the wider tracks and 16 for the garden gauges. There was also a display table in the club house. The excitement for the day was provided by Lindsay Horsley who arrived with his tram and was keen to show off its new electronic steam whistle (which had been wired in reverse). There was no whistle, just a loud bang from an exploding capacitor. I guess that is one way of being heard!!! Someone was heard to say "fit a diode..."

John Campbell made a visit to Elmore to see the 7¼" gauge railway which has been built between the full size railway and the road near the station. The owner has built two petrol-powered locos: one looking like a VR 'Y' class but actually a 2-Bo-2 instead of a Bo-Bo, whilst the second is a double-ended Walker rail car with a power unit in the centre. The transmission on these is derived from ride-on mowers and includes a reverse friction drive which runs very well. Also seen running was a petrol-electric loco. There is a large train shed where the trains are stabled and inside was a magnificent Black Five 4-6-0. We enjoyed the trip around the track which is a figure of eight with a flyover bridge.

***Steam Locomotive Society of Victoria***
***Location:*** *128 Rowans Road, Moorabbin*
***Public Running:*** *1st Sunday*

## Morphett Vale, SA

General maintenance has been keeping us busy with respect to track work — we recently took delivery of some 2000 plastic sleepers which will allow us to continue with sleeper replacement as required.

As part of the 2003 AALS Convention, MVRail held its open day on the 23rd April. We enjoyed the company of many old and new visitors to the railway, all of whom indicated that they thoroughly enjoyed the day. We also received a grant from the Office for Recreation and Sport — the cheque was presented to us by State Labour Member for Reynell, Gay Thompson MP. This grant will be put towards the construction of our station canopy to extend it over Platform 3. The Onkaparinga Council has given approval for the extension and construction will commence shortly.

***Morphett Vale Railway Inc***
***Location:*** *Wilfred Taylor Reserve, Wheatsheaf Road, Morphett Vale*
***Public Running:*** *2nd and 4th Sunday*

## Perth, WA

Castledare's AGM saw club stalwart Gerry Broom elected as our new President, taking over from Geoff Thompson who had retired for family reasons. Sadly, due to ill health, Gerry felt it necessary to offer his resignation shortly afterwards. Following new elections, Richard Stuart was confirmed as the new President, with Rod Pitt in support as Vice President.

The club's regular run days have been well attended, despite some poor weather. This was particularly true on the WA Foundation Day holiday run, held in conjunction with a local council function in the Canning River Regional Park. Passenger numbers surpassed all expectations, turning up in their hundreds, together with the Mayor and Deputy Mayor of the City of Canning. With only three trains and a minimum staff available, this placed our operation under extreme pressure, but the "gallant few" rose to the occasion and kept the trains running. At the end of the day everyone was exhausted, and could be proud of a hard job well done.

The club's stand at the annual AMRA exhibition at Perth Showground was of a high standard this year, and thanks to Craig Belcher for organising. Exhibits ranged from a 5" gauge scale loco to a part complete very large 7¼" Garratt. With a good turnout of volunteers we succeeded in catching the public's interest.

As always, there is plenty of maintenance to be done on our extensive facilities. A major upgrade of the signalling system is under way, the first part of which came into action on the May run day. Rolling stock is progressively being overhauled, with bogies and bodywork being replaced and repaired as necessary. Extensive track maintenance is in progress on the main line through the Wilson wetlands, with approximately 800 sleepers already replaced and plenty more to go. The new 5" shed is now well advanced, with electricity connected, steaming bays refitted and the traverser re-commissioned. The old workshop is due for demolition shortly, and a big effort is under way to clear out many years' accumulation of "treasures". Most encouraging of all, there has been a trickle of new faces showing up at the club.

Our club can be contacted via the secretary, Ken Belcher, on (08) 9375 1223, email: skbelcher@wiredcity.com.au

***Castledare Miniature Railways of WA Inc***
***Location:*** *Castledare Place, Wilson*
***Public Running:*** *1st Sunday*

## Petone, NZ

At our May meeting, Des Hill was presented with an endorsement for his

Driving Ticket. Noted at the meeting was the difficulty of starting loco No 2970 the previous Sunday. It was then realised that the battery has been in the loco for about eight years! Henry Cuttriss then 'held the floor' and gave us some background into the issues and workings of speed and 'red light' cameras as used by the NZ police. He was careful to point out that they are called 'Traffic Safety Cameras'! The cameras are beautifully made, being machined from aluminium stock with a standard Rolleiflex f4 lens on auto aperture generally resulting in 1/500th sec. with ASA 400 film. They take 100 feet of film and are reloaded every 2-3 days. Initially, this was necessary every 2-3 hours as there were too many motorist wanting to have their picture taken! An interesting sideline to this: the shutter manufacturers were very interested to learn that their shutters were starting to fail some time after 100,000 shots, which just happened to be their guaranteed number of operations. Henry told us about the positioning of the cameras for the angle and height for the piezoelectric sensors generally used, but these are now being replaced by inductive loops which last longer. They are now going digital too with a CRD in the camera. There are two images taken — one of the general scene (in lower definition) and one of the number plate area (taken in a higher definition).

***Hutt Valley Model Engineering Soc. Inc***
***Location**: 6 Marine Parade, Petone*
***Public Running**: Every fine Sunday*

## Salisbury, SA

The Convention has come and gone and, as expected, it was an extremely successful event with perfect weather and good attendances each day. Our new track and facilities were enjoyed by all present. However, there was no time to rest and after a quick post-Easter clean-up, it was back to our normal public running on the following Sunday. Once again, about 400 people attended and kept all our trains running to capacity. Phil Waugh visited with his SA loco no. 621 and assisted in passenger hauling. Since reopening in January, we have had excellent numbers attending our public running days. Construction of more riding trucks is on the agenda. Andew Davis is working on his 'CL' loco and it should be operating soon.

***Penfield Model Engineers Society Inc***
***Location**: Penfield Ave, Salisbury*
***Public Running**: Last Sunday*

## Upper Hutt, NZ

The start to our winter has been mild. We have had several very pleasent running days and have achieved satisfactory results. Alan is putting a final coat of paint on the driving trolley that he and Brian Shears built to go with the 7¼" gauge battery-electric club locomotive. It is an impressive vehicle, of a good size yet a robust job, well made and well finished in Royal Blue paintwork. It has a comfortable transverse seat and high sided body with a swing-open door on one side. The whole set, locomotive and riding car, is impressive in appearance.

***Maidstone Model Engineering Soc. Inc***
***Location**: Maidstone Park, Upper Hutt*
***Public Running**: Every Sunday afternoon October-April*

## Warner, Qld

We are in the middle of our winter which equates to warm balmy days and cool nights. Maintenance seems the order of the day lately with the main bridge getting another lick of paint. The brick portals to the second tunnel have been rebuilt to overcome some slippage that had occurred. Signalling is being improved and point controls are being upgraded to enable operation from a local push button station at the approach to the points. Proposals for a station halt at the roundhouse siding and a station on the elevated track are being considered. In May we were privileged to a weekend visit to one of our country member's property where 5" tracks wind around the property and across roadways. Scale, station buildings, coaling facilities, bridges (complete with rivetting) and signals (interlocked of course) made the atmosphere all the more enjoyable. Socially, a top weekend especially the Saturday night BBQ. At recent monthly gatherings, we have been privileged to hear some interesting talks. In March Col Jorgensen spoke on signals, their interlocking, how to read a cluster of signals, lever mechanisms and locking bars and the colours used for different signals (like why spectacles are red and blue). In April Ron Harris spoke on injectors in such a way as to make everyone believe that they could go home and make one that would work, even if all they had was a Black and Decker drill. Expertise and skill often show up this way. In May we were shown films made at the club by the Brisbane Video Makers Association.

QSMEE will host the AALS convention on 25–28 March, 2005 so place a note in your diaries to attend this event.

To visit our site, Contact the Secretary, PO Box 322 Everton Park 4053. Note: All persons wishing to run equipment at our site must have AALS Insurance.

***Qld Society of Model & Experimental Engineers Inc***
***Location**: 122 Warner Road, Strathpine*
***Running Day**: 2nd Sunday except Aug & Dec, by invitation. No public running*

## West Ryde, NSW

We had a visit from Channel 7 — a cameraman and presenter, Mark Warren who were preparing a segment for *Sunday Sunrise*, a program that goes to air on Sunday mornings. Mark interviewed a few members as the camera rolled. Mark left mid afternoon but the cameraman stayed longer, doing some extensive camera work including a special run with Ray Lee and his C38 No 3803. We provided a total of 2466 rides that afternoon.

## Club Roundup

Most of the material which appears in ***Club Roundup*** is gleaned from club newsletters, although an increasing number of clubs are emailing or faxing us a report for this column.

If you don't already send us your club newsletter, how about giving it a go, or email or fax us with your club news. Try to keep it to topics which are interesting to others.

**Post to**: PO Box 21, Higgins ACT 2615
**Fax to**: (61 2) 6254 1641
**Email to**: ame@netspeed.com.au

We held the President's Breakfast and Sick Kids Day and it was great to see everyone come along and have a fantastic day. Even our President arrived before the fire was lit!!! Great breakfast — snags, eggs, onions, bacon and toast: a great way to start the day. The Breakfast was followed by the Malcolm Sargent Family Day where we open our grounds to the families of kids that Malcolm Sargent supports. They surpassed themselves this year with an animal farm, a juggler, face painting, floating balloons, plaster figure painting, pony rides, dancing, singing and an African Tribal Drumming workshop, which had a lot of noisy participants. It was also an important day for Andrew Allison as this was his first public drive,as he has now 'come of age'.

On the loco side, it was good to witness the pressure testing on Henry Spencer's Shay boiler and see parts of David Thomas' SAR 620 class locomotive. Also on view were the watercut parts of a NSWGR 26 class loco and a QR A10. There were items such as coupling rods, connecting rods, motion plates, frames, etc and they certainly make a very neat job. In the loco depot was Brian Muston's 4-6-0 *Springbok* and Don Jones' C36 class loco chassis complete with smokebox, cab and other completed plate work. All it needs now is the boiler to be popped in and it is virtually ready to go. A Z19 class is all but complete, needing only the fitting of the numbers.

The first Wednesday of the month is now being used by a number of members for a run and BBQ lunch.

***Sydney Live Steam Locomotive Society***
***Location**: Anthony Road, West Ryde*
***Public Running**: 3rd Saturday (pm)*

## Farewell to our friends

*We were sad to learn of the deaths of these model engineers:*

**Barry Bailey** (LMLSLS, Edgeworth)
**Brian Bluck** (CSMEE, Christchurch)
**Frank Dunstan** (SASME, Prospect)
**Gary McDonald** (DVR, Eltham)
**Lee Rodda** (Adelaide)

*We share the sadness felt by their families and friends, and offer our sincere sympathies. We also remember the many great times we've enjoyed together in our wonderful hobby.*

# Coming Events

## 27 to 28 September
## Invitation Day & Swap Meet — Evandale, Tas

This will held by ELRSS on the last weekend in September at our Evandale site. There will be a Swap Meet (let us know if you would like a table) and Invitation Run (open to members of ALL Australian and overseas! clubs) on Saturday (open to the public for 7¼" rides) followed by the normal public day on Sunday (stay and enjoy carrying passengers or just riding yourself). The "Drive the Loco" HO gauge layout to be set up for the young and young at heart.

## 19 to 21 September
## Invitation Run & Floriade — Canberra

The members of CSMEE invite you to a weekend of steam in the national capital. Following last year's success we are again holding this run the weekend before our public day, so no public. 5/7¼" ground level track, min radius, 13.7m, swing nose points accept most wheel standards. Char, briquettes, steam oil and petrol provided. Boiler certs must. Saturday night meal, sleeper car beds avail. Ph/fax Col Fuller (02) 6251 1779

## 4 to 5 October
## Annual Interclub Steam-up — Port Augusta, SA

The Port Augusta Model Engineers will once again hold their annual interclub steam-up on the long weekend in October at their grounds in Homestead Park, Port Augusta. Track is 5" gauge ground level, min. radius curves 40 feet. Details from the secretary 5 Higginson St, Port Augusta SA 5700

## 4 to 6 October
## Centenary of Old Casino Station & 13th Birthday of Pacific Coast Railway Soc. — Casino, NSW

The Pacific Coast Railway Society Inc invites you all to the Casino Miniature Railway and Old Casino Station Museum to celebrate the 100th Anniversary of the running of the first train between Lismore & Casino and official opening of Casino Railway station in October 1903. Labour Day week-end is also the 10th Anniversary of the official opening of our Miniature Railway which runs from North Casino station on the corner of West St & Queensland Rd, almost 2k to Old Casino Station, now a railway museum. All owners of miniature locos and rolling stock will be very welcome to run on our dual gauge 5/7¼" ground level track, as well as display and operate of all types of model road vehicles over the 3 days. In addition, a train will arrive from Sydney, hauled by steam loco 3801 and a diesel. It will leave Sydney on the Friday, stay over at Taree and arrive in Casino on Saturday afternoon. On Sunday the diesel will take a train to Murwillumbah and return, while 3801 will do a trip to Lismore, returning to Old Casino in time for the Centenary celebrations. The steamer will be running Casino – Rappville, return and Casino – Kyogle, return for the rest of the day. On Monday the diesel will be in the Old Casino yard for public inspection— 3801 will follow the same programme as the previous day. Tuesday will see the train depart for Sydney. More information can be obtained by phoning the President Jim Fitzgerald on (02) 6662 7923, or assistant secretary Michelle Sciffer on (07) 33964126. e-mail shellsci@hotmail.com Also our website – news flash page - will keep abreast of the happenings at: www.casinominirail.com/

## 10 to 12 October
## 30th Anniversary Run — Galston

Hornsby Model Engineers will hold their 30th Anniversary run from Friday 10 to Sunday 12 October. Friday and Saturday reserved for AALS Members. Sunday is public running day and visiting AALS members are welcome to participate. Night running Friday and Saturday evenings until 10.00pm. Lunch, morning and afternoon teas will be available over the 3days. Current boiler certs required. There will be a display of stationary steam and internal combustion engines, farm engines and boats. Enquiries to Secretary, Ted Gray, on (02) 9484 7583.

## 11 to 12 October 2003
## Berry Railway Inc. Invitation Run — Berry NSW.

Berry Railway Inc. invite all true believers to take part in our 2003 Invitation Run at the Penwood Line, Jaspers Brush. Steam, diesel, electric and traction engines all welcome. Our track is 7¼" gauge only, 1.25 km. of scale track laid on concrete sleepers. Camping facilities on site. Choices of accommodation in Berry and Nowra, from Bed and Breakfast to Motel. We supply char, 12 volt and compressed air also available by the bucket load. Up to 4 metres unloading facilities. Berry is a lovely little town, a very popular tourist spot, plenty of cafe, craft, antique and gift shops. Boiler certificates a must, AALS codes observed. Wheel profiles are AALS std. Fine scale or narrow gauge. For further details contact; Trevor (02) 4447 8417 or e-mail piglet@virtualcity.com.au

## 17 to 19 October
## 15th Australian Miniature Traction Engine & Road Steam Rally — Wauchope, NSW

For further details see the notice below.

## 18 to 19 October
## 40$^{th}$ Birthday Celebrations — Perth, WA

Castledare Miniature Railway members invite all AALS members to join them in their celebrations. Almost 5k of 7¼" track, extensive 5" track. Sat. private, Sunday public, homestay billeting on "first in best dressed" basis. Rod Pitt (08) 8313 2597 or Tom Winterbourn (08) 6330 9122, mob.1415 682 931

## 18 to 19 October
## Invitation Run — Cobden, Vic

Run on almost 3km 5/7¼" ground level track plus a raised 5/3½" track. Extensive signal upgrades with gantries make for even easier running and fun at night when all signals are lit. The weekend is also the Cobden Spring Festival with stalls, crafts and many interesting exhibits, garden openings, culinary and cultural events, and parades for viewing, tasting and participation. Saturday will be a "closed" day with no public admitted. Sunday is our public running day, and we would appreciate any assistance operating trains or staffing for guards. However, it is NOT compulsory to pull passengers and you are most welcome to run as it all adds to the railway atmosphere. The SWME follows AALS & AMSBC codes of practice — current boiler tickets a must and an inspection by our safety officer to be undertaken before running. Drivers who wish to run at night should have an adequate head and taillight on their loco and last carriage. Tea, coffee and light lunch are provided as is char, and unleaded fuel for locomotives. Storage is available overnight for locos. Our Buffet Car tearooms will be open for the purchase of other foods and drinks. For further information please contact 0418 311 998 or John Wiggins on (03)5595 1430 by 1 October.

## 15 to 16 November 2003
## Annual 13 class Invitation — Fairfield

The Western District Live Steamers Co-op Ltd will be hosting our Annual "13 Class" event at our club grounds, which are situated in the grounds of the Fairfield City Showground, Smithfield Road, Fairfield, located on the western side (adjacent to Moonlight Rd). An invitation is extended to all to participate in our Annual 13 Class run including Steam, Diesel and Electric Locomotives. Air and 12v is available. We have elevated 2½, 3½ and 5 inch as well as Ground level 5 and 7¼ inch track. Plenty parking is available. A Hot meal will be available on the Saturday evening at a nominal cost. Please confirm to help with catering. Saturday night running will be permitted. For further information contact the secretary Ken Pascoe (02) 9772 2336 or Shawki Slemon on (02) 4736 3035. Mail to WDLS, P.O. Box 403, Mt Pritchard, NSW. 2170.

## 8 to 12 January 2004
## Steam & Steel 2004 — Hamilton NZ

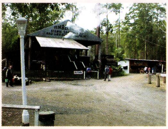
The Hamilton Model Engineers are hosting the next NZ Convention. Details on next page.

# 15th Australian Miniature Traction Engine & Road Steam Rally

**at the historic Timbertown Heritage Village, Wauchope, NSW**

## 17th — 19th October 2003

Timbertown, set amongst 87 acres of picturesque natural forest in the heart of Wauchope, is an entire village, re-created to demonstrate the struggles and achievements of our pioneers. The village and oval makes a wonderful venue. A scrumptious sit-down dinner for Saturday night is available on site in the Timbertown Hotel and Function Centre which is also licensed. There are nearby Motels, Caravan Parks for accommodation. Limited 'Bush' camping may also be available.



*For full details on the Rally, etc. ...*

***Contact Paul Stanley phone (02) 6587-5188 or email: stanleymob@aol.com***

# STEAM and STEEL 2004

## New Zealand's
## International Convention of Model Engineers

**at Minogue Park, 24 Tui Avenue, Hamilton**

## 8th — 12th January, 2004

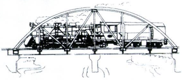
***Join the Hamilton Model Engineers for 5 days of steam, fun and excitement!***

### Track Information

- 1.6 kilometres (1 mile) comprising 2 separate circuits, one 3½"/5"/7¼" gauges and the other 5"/7¼" gauges. Each track offers a choice of routes with many interesting features.
- Each set of points (switches) is driver operated and route-joining ones are run-through, needing no manual change.
- Steaming bays for all 3 gauges are accessible by loading bank, hoist or bridge. Water and power available.

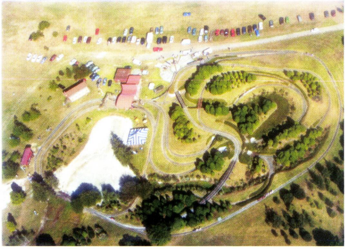
### Refreshments/Entertainment

* Drinks continuously available in marquees
* Morning and afternoon tea daily
* Lunch can be purchased every morning
* BBQ every evening except Saturday
* Formal dinner on Saturday evening
* Entertainment each night — fireworks, etc.
* Night running
* Showers and toilets on site
* Outside visits and surprise trips
* Competitions and displays, prizes and awards



### More than trains ...

*Traction engines will be running throughout the weekend., there will be an exhibition of model engineering, displays of stationary engines, vintage tractors/vehicles and a selection of craft and model stands to visit. The original Frankton Junction signal box and an ex NZR diesel locomotive are also on site.*



### Accommodation

*Hamilton, being NZ's 4th largest city, offers a wide variety of accommodation — hotels, motels, camping grounds with cabins as well as bed & breakfast establishments. A list is available on request from the convenor*

**Register now! Time is running out**

***Be part of it — tour groups have already been arranged from Australia and North America!***

***For further information and registration details please contact Valerie Clark at:***

51 Alderson Road, Hamilton New Zealand

**Phone:** 64 7 855 1927 **Fax:** 64 7 855 1307 or **email:** bandv.clark@xtra.co.nz

---

## NEW ZEALAND STEAM TOUR 2004

**Attend the Steam and Steel Convention in Hamilton**

**Followed by an exciting 2 week tour of miniature and full size railways in New Zealand's North Island.**

***Visit:***

* *10 miniature railways*
* *Tokomaru Steam Museum*
* *Glenbrook Vintage Railway*
* *Steam Incorporated, Paekakariki*
* *Mainline Steam Trust (2 depots)*
* *Southward Motor Museum*
* *Cruise on Paddle Steamer Waimarie*
* *Wairakei Geothermal Power Station*
* *Whakarewarewa Thermal Reserve*
* *Coromandel Gold Stamper Battery*
* *Waitomo Glow Worm Caves*
* *Wellington Tramway Museum*
* *Travel by Train up the Raurimu Spiral*
* *Driving Creek Railway*
* *Rotorua Agrodome Show*

***Enjoy:***

* *Thermal baths*
* *Luxury travel*
* *Good accommodation*
* *Stay on a Marae*

**Plus much more !!!**

***HURRY — BOOKINGS CLOSE SOON!***

*Tour price of* ***$3995*** *includes return airfares from Brisbane, Sydney or Melbourne, accommodation and transport in NZ, all breakfasts, visits & some meals*

*Contact David Holt at :*

**Railtours Unlimited, 1/176 Ewing Road, Woodridge Qld. 4114 Australia**
**email:** drh@bigpond.net.au **or phone (07) 3808 4819** (Mon, Wed, Fri or Sat)

# Toodyay Miniature Railway Inc.

### by June Eastwood

The 7¼"" Toodyay Miniature Railway, situated in Duidgee Park on the banks of the Avon River in Toodyay, Western Australia, was declared open on 9 July 1996. The LEAP programme which gave long term unemployed a chance to gain new skills, saw 9 participants under the eye of a local engineer, fabricate track, prepare 2750 sleepers, and erect fences and turntable. Not only did they gain valuable experience which saw 7 of the nine go on to long term employment, their enthusiasm for the project saw the voluntary construction of a 400 metre walkway over difficult terrain alongside the Avon River. In conjunction with bricklayers' apprentices they laid the slab for and erected a brick station building. Before the project came to completion the LEAP programme concluded. This was when the local community swung into action and volunteers laid the final 500m of track.

Since 1996 a small but enthusiastic club has seen steady progress and improvements. In April this year they successfully tendered for 1100 metres of track and 2 turntables from a defunct commercial operation at Lake Leschenaultia. Over several strenuous days they dug up approximately 3500 solid concrete sleepers and transported these, together with track and turntables, the 60 km back to Toodyay. Work then began in earnest to convert a very large turntable into a bridge to ford a deep gully. Previously the line traversed through paper bark, jam and gum trees to emerge on the banks of the Avon before traversing round a loop to return on the same line, enabling a journey of approx 1.2km. However, this meant only one train could be run safely which was a source of frustration. With the new bridge now in place the trains will complete a circular route, branching off from the loop and across the gully before meandering back through age old river gums and beside gully pools to the station. Not only will it be possible to run two trains on the line, a new and different vista will unfold for train passengers. The club presently operates one steam and two diesel trains but two new steam trains are due to come on line in the new year.

A long term project is for a line following the Avon River in the opposite direction which will be completed with earthworks being done in conjunction with a cycleway proposed by Toodyay Shire.

Apart from the track and infrastructure, the club has acquired two valuable West Australian Government Rail carriages. The first, built in 1897 by the Ashbury Railway Carriage and Iron Co. in Manchester, England, was found derelict in a paddock outside Toodyay. Over countless hours this guards van was removed to the club's site in Duidgee Park and completely restored. The carriage, which still contained the pot belly stove, chairs and all shelving and an authentic stretcher which was suspended from the roof, was donated to the club. It has been carpeted and has become the club headquarters. The second carriage, a rare tipping DC wagon was installed at the entrance to Toodyay as a token when the centenary of rail was celebrated at Toodyay in 1989, but it had fallen into complete disrepair. Permission was granted to move this wagon and join it to our existing wagon where again many hours dedication was needed before its restoration was complete. This now houses all equipment needed for our operation. The DC wagon ('Dancing Charlie') was so named because when overloaded with wheat it tended to 'dance' along the line and frequently overturn. There was a mark to which height the wagon was meant to be loaded, but with the dust billowing out as wheat was poured in, this line was not visible. To address this problem it was ordered holes be bored around the perimeter of the wagon at the appropriate height so that the spilling grain would alert those filling up. However indignant station masters ordered the holes be caulked up as they did not want unsightly mounds of grain polluting their yard — so once again over-filled wagons ' danced' down the tracks till many overturned!

Shandy, *built by George Shand in Queensland in the 1960s was purchased by Jack Stanbridge of Perth, WA and modified to look like a WA P class. In 1997 it was purchased by Stan Eastwood of Toodyay, and seen here, now runs regularly on the Toodyay Miniature Railway.*

Our station name *Newcastle* also has an interesting history. In 1860 the new town was given the name of Newcastle, but over the years much mail intended for this area went to Newcastle in New South Wales. The culmination was when an expensive and ornate gilt French clock was forwarded to Newcastle, Australia and became the prized possession of the eastern postmaster who was unable to find any person of the name listed on the address in Newcastle, NSW. While boasting of his good fortune to the then Governor of Western Australia, who was visiting the postmaster's home, Sir John recognised the name of the intended recipient as that of a prominent settler in the Newcastle, WA area. The clock finally came over to its rightful owner but in consequence in 1899 the town was renamed Toodyay, an English derivative of the tribal name of the local chief's pretty young wife.

***Toodyay Miniature Railway Inc.***

***Location:*** *Duidgee Park, Toodyay WA*

***Public Running:*** *1st and 3rd Sunday, Easter till late November*

---

## Tool Bit Sharpening for the Diamond Tool Holder

### by Des Burke

Over the years when demonstrating the Diamond Toolholder, I have been frequently asked "what about using it on brass?" and "have you an easy answer for boring?" The former I can be of some help, for the latter I have no easy fix.

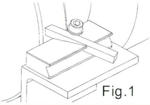


Fig.1

The answer to sharpening the tool for brass work is quite simple. To reduce the cutting angle, locate the cutting tool in the grinding fixture reverse to the normal method as shown in figure 2. Figure 1 shows the normal sharpening method. When sharpened for brass work, the top rake is reduced considerably, while the top-side rake is unaltered. This reduces the diamond shape on the end of the tool bit. With a little care, the tool can still be set to give both diameter cutting and shoulder facing.

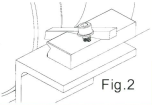


Fig.2

# Metrology

## The Physics of Measurement

### by Dennis Collings

## The History of Measurement

To determine the measurement of an object (or length) with something accepted as a standard, before we can define that size or length, we must have a unit. If this unit is well defined and can be accurately reproduced, sizes or lengths can be universally measured, and agreed. We accepted this fact centuries ago, and since that first acceptance, efforts have continually been made to re-define the unit, or standard of measurement, so that it could become more universally agreed and accurately reproduced.

Looking at our early English units, the Anglo-Saxon fathom, the distance between out stretched arms, was subject to quite a large amount of variation. Later, half a fathom was accepted as a more convenient length and King Henry I (Norman King 1068-1135) decreed that the distance from the tip of his nose to the end of his thumb with arm outstretched was the lawful yard (36ins). The yard was subdivided into three segments of twelve inches, the inch being the length of three barley corns, round and dry, or the distance between the joints first finger right hand. The fathom (6ft) was used at sea for depth readings and also by Cornish miners in England and Australia for the depths of mines right up until the metric system came in. A bronze bar was made as a means of standardising the length and this was kept in the King's Exchequer. These standards were replaced from time to time under different monarchs — Queen Elizabeth's Standard Yard completed in 1558, remained the standard until 1834. It was destroyed in the disastrous fire which burnt down the Palace of Westminster on 16 October 1834. The last standard was completed in 1855 and two copies passed over to the USA. The Americans however passed a law in 1866 defining the yard and metre as 39.37 inches. The standards as a consequence became different and in later years as accuracies of measurement increased this created difficulties.

The Imperial Standard Yard of 1855 remained our legal standard, although it was known that very slowly it was decreasing in length, until 1963 when the Weights and Measures Bill said that "The yard or metre shall be the unit of length and the yard shall be 0.9144 of a metre exactly. One inch should equal 25.4mm.

The Metric Conversion Bill was introduced in the Australian Parliament in March 1970. The object of the bill was to bring about progressively the use of the metric system of measurement of physical quantities by 1977.

## Standardisation

A definition of standard is something that is set up, and established by authority as a rule for the measure of quantity weight, extent, value or quality. In Australia we have such authority, and these facilities generate, maintain, and develop our standards so that our industries, and educational establishments can achieve conformity both nationally, and more importantly, internationally. It is highly desirable, and extremely necessary that our industries have nationalisation of standards.

There are four establishments that act as our authority in governing Australian standards. They are:-

1. Standards Association of Australia (SAA).
2. National Standards Laboratory (NSL).
3. Defence Standards Laboratory (DSL).
4. National Association of Testing Authorities (NATA).

**Standards Association of Australia**:- is a national organisation for the promotion of industrial standardisation in Australia. It is an independent body, incorporated by Royal Charter, and has endorsement and full co-operation both from government and industry. It provides an impartial organisation for the preparation of standards by round table collaboration.

**National Standards Laboratory**:- is composed of two Divisions of the Commonwealth Scientific Industrial Research Organisation. These are the Division of Physics, and the Division of Applied Physics. The Laboratory assists science, and industry by developing precise standards and methods of physical measurement, on behalf of CSIRO and is the custodian of most of the Commonwealth's legal standards of measurement. It is located in the grounds of the University of Sydney.

**Defence Standards Laboratory**:- has inspection authorities for each of the three armed services.

**National Association of Testing Authorities**:- is an organisation for the co-ordination of testing facilities through registration of test laboratories operated by individuals or organisations. It is governed by a council of members representing federal, and state governments, chambers of manufactures, standards associations, and professional institutes. Today there are over 300 laboratories registered with the association, and they have authorisation to issue test certificates in any of nine fields of testing. Our main test metrology laboratory was so authorised.

The small metrology laboratory I worked in controlled the inspection for a medium size tool room, jig boring room, and instrument workshop.

Work load covered —

1. Engineering metrology.
2. Examination. of engineer's limit gauges.
3. Examination of jigs, fixtures, cutting tools and components.
4. Examination. of engineer's measuring tools and instruments.
5. Testing of machine tools, enlinement, etc.

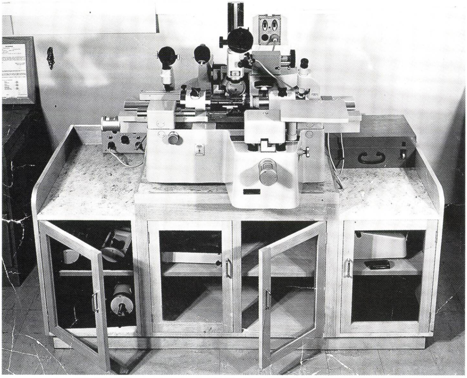


**Figure 1**

6. Assessment of surface finish.
7. Examination of gears, splines, and serrations.
8. Hardness test on metal products.
9. Examination of working standards of length, and angle.
10 Anything else the engineers and heads of departments could think up to give us a headache!

The laboratory temperature was kept at 68+/-2°F (20+/-2°C) the workshops were kept at 60-76°F (16-25°C). The jig boring, gear cutting, and precision grinding rooms were kept at 68°F (20°C).

See **figure 1** for a photograph of our large measuring microscope on a heavy angle steel bench camouflaged with a wood cabinet.

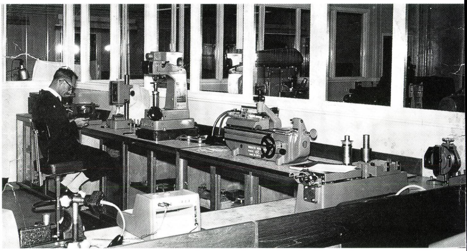


**Figure 2**

## Equipment in Figure 2

See **figure 2** for a general view of part of the metrology room I worked in for many years. I retired in 1983. Though the measuring machines have changed little, they may now be connected to a computer screen, or printer for readouts. My read outs were by note pad, and pencil, or standard forms! On the front bench can be seen two gear checking machines. The one on the left connected to a recorder for checking 60 - 120 diametrical pitch, the one on the right for 16 - 40 diametrical pitch with an attachment for checking helical, and bevel gears.

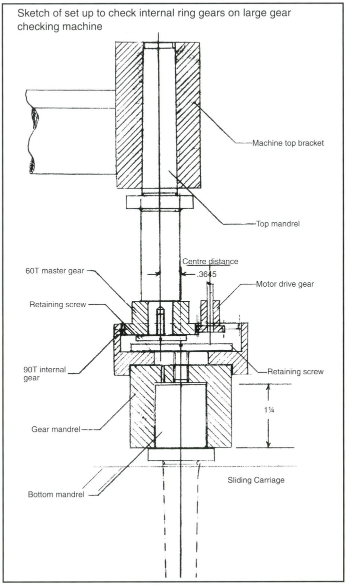


**Figure 3**

**Gear checking machines** 16-60 DP and 40-120 DP (20 degrees Pressure Angle). Gears are checked by running against master gears on a floating measuring carriage at a known spring pressure. The motion errors are recorded by a precision indicator which also gives a readout on graph paper. The two-flank rolling test is thus a composite check, subtracting the errors shown on the graph supplied with the master gear. These machines were used to check class one gears (all errors contained with in +/-0.0005 inches) built into the control boxes on radio controlled target aircraft.

**Optical scale horizontal measuring machine** (Societe Genovoise, Switzerland). Placed next on the back bench, this machine is used to inspect plug gauges, thread plug, and ring gauges. The machine was used to check the larger gears over measuring wires. You have to spend a great deal of time to measure to metrology standard. Below in the glass door cupboard are other attachments like centres to hold plug, and thread gauges and a small table to fit on the machine to hold ring gauges for measuring their inside diameters. These were fitted on balls in „V" grooves to move to find centre. With a fine threaded screw to rock the table to register the greatest diameter, up to ten measurements would be taken in each position and averaged out (about sixty measurements for top grade ring, and plug gauges). There are a set of small centres which fit on the side of the machine to hold thread gauges for pitch testing by a tapered probe held in that Y shaped casting.

Next on the bench can just be seen three ring gears. These gave us a great deal of trouble in machining, and inspection. Being a services job one of their inspectors sent the first one to the main metrology laboratory for checking, which they did on a surface plate the ground outside diameter of the ring gear moving around in a vee block held against an angle plate at the back. The sixty internal teeth were checked one by one with a dial test indicator and height gauge. Over a ground and lapped gear-measuring pin rocked to obtain the high point, the report was we were out of tolerance, so back to the drawing board. First the master gears we had were too large on pitch diameter so a new home-made master gear half size on pitch diameter waschecked for errors, and noted on our large gear checking machine with the head attachment fitted. Two new mandrels were made, one to hold the gear under test, and one to hold the small master gear in a vertical plane (see sketch of set up — **figure 3**). The services inspector approved the set up, provided the graphs of the internal and master were attached to each ring gear so tolerances could be worked out.

**Hardness Testing Machine** (Hauser Germany) This machine will test all three hardness scales Rockwell, Brinell, and Vickers. There are three hardened master test pieces supplied to reset the machine when changing scales plus one penetrator for each scale, each in balance to the weights supplied.

A parallel beam of light with a graticule line, is reflected from a mirror attached to one end of a beam, projecting the graticule on a plastic screen showing the hardness number for the component under test.

I'm seen here using a comparator to check major diameters on a ground shaft. A slip has been placed on the table to allow for steps on the shaft. The size was set with slips and the comparator was set to zero and the component was rolled over the slip to check for ovality and size.

Next on the bench are our ten inch sine centres.

## Laboratory Equipment not shown in photographs

**"A" grade cast iron surface plate** 36.24 inches (914.609mm), and designed with reinforcing ribs for rigidity, and stability under load.

**"A" grade black Granite surface plate** of close grain, and uniform texture, aged through millions of years, has the advantage of being rustproof, non-magnetic, non-wringing, non-abrasive and free sliding. If a sharp object is dropped on the plate it will not raise bump or burr, it will cause a small chip. Some of the Granite surface plates have tapped inserts in the top surface to allow bolting down of equipment for laser set up experiments, etc.

The work machined on the large Jig Borers to +/- .0002" is impossible to be reproduced on a surface table. The operator gave me his X/Y datum figures and drawings and I then had to calculate the centre lines for all bores, and holes using trigonometric functions. Before machining was started the operator and I compared our two sets of figures. After machining, inspection then was then a simple matter of setting the centre line co-ordinates on the X/Y optical scales, then swinging a dial indicator from the machine head, and if the reading is zero all round,_OK. Then it's a case of measuring the size of the bore with an inside micrometer, or bore gauge

## Surface plate Equipment

**Parallels** — A rectangular bar of steel hardened, accurately ground, and lapped on all four sides.

**Angle plates** — Cast iron machined , ground with slots, and tapped holes for attachment. 4 - 6 and 12 inches.

**Standard bore gauges (figure 4)** — Range from 1/16 ' to 6" diameter in set, supplied with ring gauges for each one for zero setting.

**Slip gauges (figure 5)** — Are manufactured from a special high grade carbon steel, hardened throughout, and processed to relieve all stresses, then lapped to a superfine finish, measured by interferometry, and selectively graded into sets of 81 pieces (imperial) and one set of metric. Slip gauges are built up to different sizes by wringing the blocks together. Repeat with more slips until the size required is achieved, using the least number of slips.

**Length Bars** (Hoke Slips.) **(figure 6)** — Made in the same way as above only one inch square, with a gauge thickness or length. Each had a centre hole of 1/4" dia. to accommodate a series of holding rods, and counter sunk screws, to allow long lengths to be held to gather. The second box contained a number length bars measurements increased by .0001 inch up to one inch then, from 2 inches to 6 inches in 1 inch increments, then in 2 inch increments to eighteen inches, plus 3 pairs of jaws for internal gauging with a thickness of .1, .2, .25, which has to calculated in your slip length. There are five holders of different lengths so the slips, and jaws can held firm. They can also be used for a height gauge with the base, and other attachments supplied (see sketch).

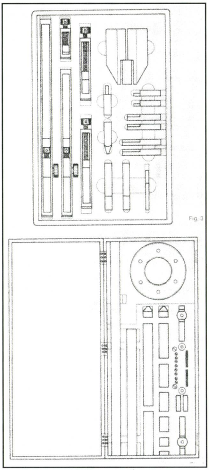


Figure 6

Some nut sent them to our main store to be plant numbered by electrical etching, which they carefully did on each length on the gauging surface! We had to get each end relapped, which we had to adjust for the error of a few tenths on each length. After this, when I heard that the plant numbering clerks were coming one weekend to take an inventory, to get my own back on them I left a mouse trap on the bench, suitably baited with a piece of red tape. I got one so it must have been the right bait! In the shit again.

**Vertical Micrometer** — Eliminates the use of high piles of slip gauges with the danger of being knocked over and damaging the surface table. The main frame of the instrument is an iron casting, the base being machined, lapped flat, and square to a central slot, in which slides a cast iron column machined with alternate steps an inch apart. The column is moved up and down over an inch of movement by an enlarged micrometer thimble fitted to the top, thereby dividing each inch by direct reading to 0.0001.

**Steel Balls and Rollers** — Very useful standards of another type not so well known as slip gauges, are steel balls, and rollers guaranteed to be within +/- .0001 of their nominal size. They are indispensable for the measurement of tapers or angles.

*To be continued ...*

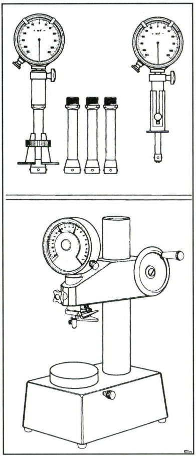


Figure 4

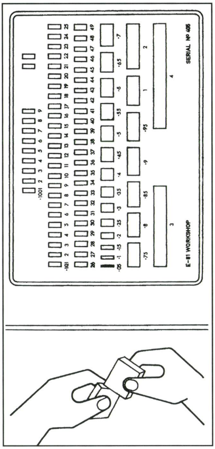
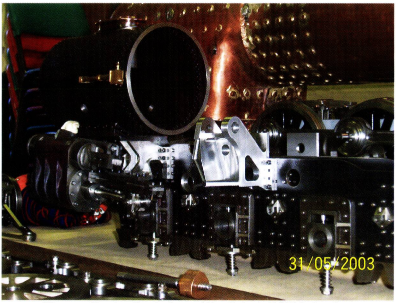


Figure 5

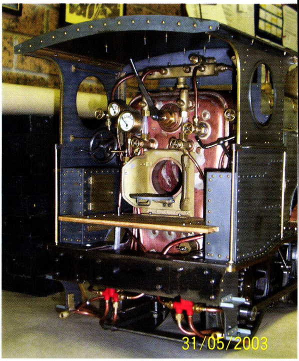
# Sydney Live Steam Locomotive Society

## NSW Interclub Visit — 31 May 2003

### by Warwick Allison



*5" gauge Evening Star in front of Ken Baker's N&W J class loco*



*The cab of Barry Potter's NSWGR P class 4-6-0*

*John Lyons oils around on a brand new 1915*

The weather was absolutely perfect. The gates were opened at 7am, with the first visitors (from Orange!) arriving about 8am. They narrowly beat a large contingent from Lake Macquarie. It was interesting to see those the furthest away arrive first! The registration shows visitors from:

Lake Macquarie; Bathurst, Wollongong, Western Districts, Hornsby, Mooroolbark (Vic), Twin Lakes, 7¼ inch Gauge Society (must be UK!), Bankstown, Central Coast, Canberra, and Warringah ME.

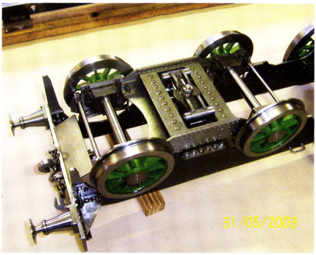
There was a steady stream of locos coming and going and it would be true to say that they were all quality jobs and I don't think any one had any real troubles. Running was faultless and the signal box managed to cope with the instantaneous demands of the train crews!

The boiler inspectors were kept busy and the official boiler attendance register on the day recorded a total of 20 locos, which included 5 non-steam. A high light was the first public run of John Lyon's 5 inch gauge 19 class loco!

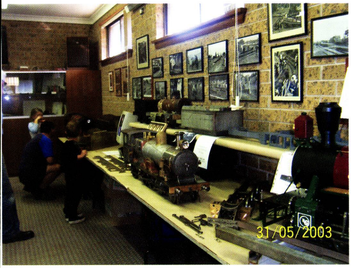
There were a lot more visitors than locos and I am sure most people came to see and chat!

There was an extensive display in the clubhouse of components, partly and near finished locomotives and this was very well received in conjunction with the continuous videos and digital piccies, as well as our usual historic display on the clubhouse walls and in the display cases. It

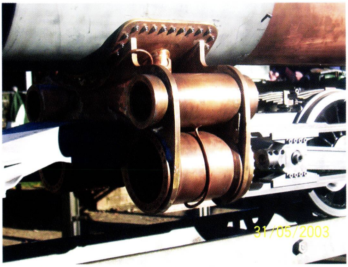
*Henry Spencer's 3-truck Shay power unit*



*Allan Mackellar's M class front bogie — with swing links!*



*A view of part of the display in the clubhouse*



*Ken Baker's 5" gauge Norfolk & Western J class fabricated cylinders*

would be true to say that model engineering is alive and well!

## The display included:

Jim Leishman's 10 wheeler; Barry Potters lastest production — a P class, Ross Bishop's 50 class, Andrew Allison's A10; David Thomas' 620 class; Alan Mackellars M class (see the attached photo!); Scott Murray's AC16 frames, Don Jones 36 and 57 class; Ken Baker's J class, Jim and Dennis Mulholland's *Evening Star*, Henry Spencer's Shay, Matt Lee's 25 class tender, Max Gay's new tender tank for *Bitza*, John Tulloch P class bogie, Bernie Courtenay 3½ inch g 36 class rebuild; Barry Tulloch's 2½ inch 36 class and passenger cars; Brian Hurst's *Dyak*; and Warwick and Andrew Allison's various water cut components. The standards are very high and the prototype miniatures a joy to behold!

Bernadette, Joy, Dianne and Liz did an excellent job with the lunch, and in the evening they really excelled themselves with most professional catering for about 35 evening meals. Thank you very much.

*John Tulloch's 2904 fresh from a rebuild at the Homebush Loco Works*

**Have you noted AME's new email address yet? ame@netspeed.com.au**
**The old email address will cease to operate on September 15**

# Product Reviews

### Australian Model Engineering Magazine Index for Issues 1 to 105

The long awaited print version of the **AME Index** is now available. Comprising 140 pages it provides a complete index for all issues from no. 1 (October 1987) up until the end of 2002. The Index is divided into 3 sections for easy reference — indexed by

(a) Article Name (b) Category/Subject (c) Author's Name

Comb-bound with a clear plastic cover, this volume is easy to read with a larger font size than many index publications use. Another useful feature is that in cases where the title of an article does not sufficiently convey what an article is all about, there is also a brief description given.

There is no plan to make the Index available on CD or the Website at this time. This decision may be reviewed at some future date when all production costs have been covered on the print version.

Available only from **AME Retail** (see inside back cover)

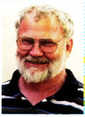
Price **$19.95** (including postage within Australia

*(Overseas readers should enquire prior to ordering)* ***— David P.***

Australian Model Engineering

INDEX
to
Australian Model Engineering magazine
Issues 1 to 105
October 1987 to December 2002

# Tracks ' n' Trees



## Some garden layout ideas for restricted spaces

### with David "Doc" Wescombe-Down

If you are one of the many who have space restrictions impinging on your wish for an outdoor railway, do not despair! There are several ways for you to approach making that wish an operational reality.

*Tracks 'n' Trees* is primarily concerned with gauges O and 1 at this time, but if a OO track-powered layout is all your space will accommodate, go ahead and build it, operate it and enjoy it. However, with a little ingenuity and a touch of compromise, the larger gauges can still become reality for most settings.

We are not aware of any prescriptive benchmarks as to what is "big" and what constitutes "small", in garden railways — it is more about perception, and optimising the space you have available. There will be the potential for lots of model engineering **and** railroad operation, irrespective of the layout's physical dimensions. To get there however, it may be necessary for some right-of-way negotiations with one's partner and other family members — the backyard, courtyard or balcony probably needs to be multi-purpose. So, spend the necessary time and verbal energy (plus buying chocolates, wine, flowers and making all sorts of promises for holidays etc!) and work together on the concept if you can. It saves friction later. The layout may be integrated into an existing garden, landscaped in its own right, or simply run around the prevailing fences or walls.

Having negotiated to that point, here are some basic ideas for layouts in your space available — the patio, garden, courtyard or balcony. They are just ideas so use your imagination and tape measure to see what will fit, and where. Life is full of compromises and this may be another of them. You choose whether it is to be at ground level; framing a vegetable bed; multi-level joining a couple of raised planter boxes with lift-out bridges to maintain access integrity when the trains are not running; or a dedicated shelf-line along a wall or two. The suggestions shown are loosely based upon a single side length of 2.4 metres and a two dimensional area of approximately 3 by 2.4 metres — alter these to suit the minimum radius curves for whichever gauge(s) you choose, and your actual space available.

When space is really tight, what you build can benefit from more attention to detail and thus becomes a super-detailed, working diorama outdoors. The potential depends on whether you opt for:

- single straight track
- dual track, same gauge
- dual track, dual gauge (maybe Gauge 1 for the mainline and Gauge O for an accompanying narrow gauge mining or logging line that feeds it)
- L-shaped bend around a wall/fence corner
- C-shaped bends around two wall/fence corners
- a length of anything from three to thirty metres
- spurs, sidings, mainline station, locomotive maintenance depot, engine washing facility, freight depot(s), goods yards, town structures, bridges (trestle, truss, culvert, timber, steel or stone), diesel fuel facility or coal staithes, and so on.
- using model motor vehicles, ships or people to dress up the scenes

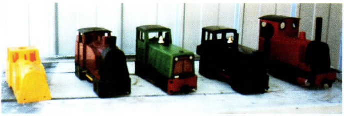
You can purchase everything ready-to-run, modify secondhand items you scrounge from everywhere, or hit the workshop and build it yourself.

Here are ten ideas just to get you thinking — the **real** concept

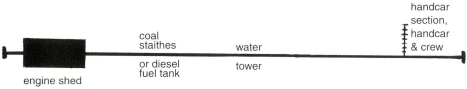
*The ballast is all done now on the "Whimsey Line" of 'Doc' & Ingrid*

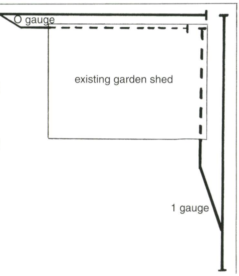
*A trestle, dry wash with boat wreck and guard rails now installed*

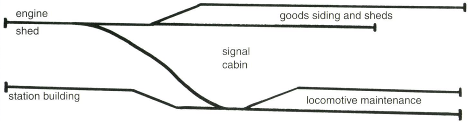
*Evening shadows on the station halt.*

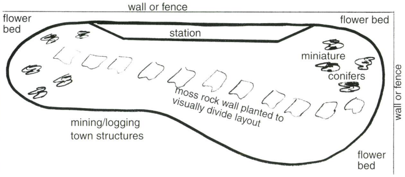


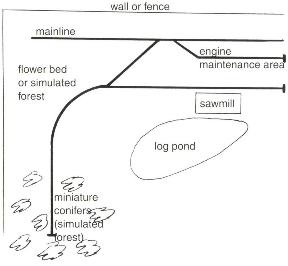
*Playing with a plastic shell (O gauge) — (left to right): basic shell, 'Big Big' steam loco (battery), Ruston diesel (battery), Plymouth diesel (battery) and a gauge 1 steamer (battery)* and creation lies within you, but whatever the area you have, get busy and use it!

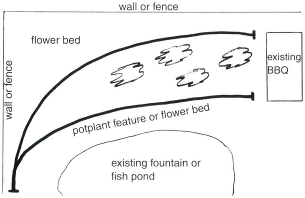


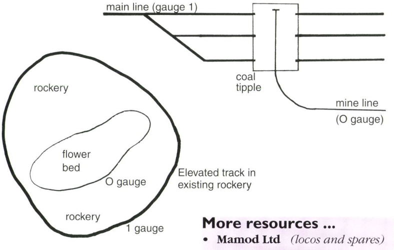


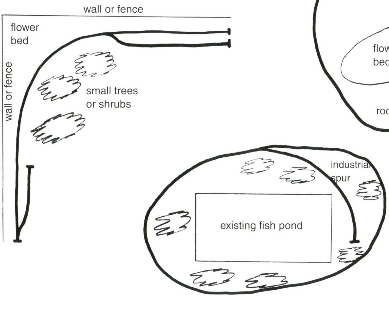





wall or fence
mainline
engine maintenance area
flower bed or simulated forest
sawmill
log pond
miniature conifers (simulated forest)


wall or fence
flower bed
wall or fence
existing BBQ
potplant feature or flower bed
existing fountain or fish pond





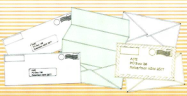
## More resources ...

- **Mamod Ltd** *(locos and spares)*
  Unit 1A, Summit Crescent
  Smethwick, Warley
  Birmingham B66 1BT
  UK
  website: www.mamod.co.uk

*also at:*

- Unit D, Henfield Business Park
  Shoreham Road,
  Henfield Sussex BN5 9SL
  UK
  website: www.mamodspares.co.uk

# Letter Box



## National Railway Museum

Sir,

I write in respect to the article which appeared in the July/August edition of your magazine – "47th Annual AALS Convention." NRM was very pleased with the article and obviously your kind comments about our museum and the collection.

Whilst there has been some criticism from (mainly) interstate organisations, in regards to the claim of National Railway Museum, we do believe it's fully justified. The following table demonstrates just a few reasons why it has been accepted as the National Railway Museum.

**Rolling Stock Comparisons**

| Item | | Operator | Gauge | Similar or same |
|---|---|---|---|---|
| Y 12 | 2-6-0 | Silverton | 1067 | SAR, TGR, QR, WAGR |
| W 25 | 4-8-2 | Silverton | 1067 | WAGR 'W' class |
| G 1 | 4-6-0 | CR | 1435 | NSWGR '32' class |
| NM 34 | 4-8-0 | CR | 1067 | QR 'C17' class |
| GM 2 | diesel | CR | 1435 | VR 'S' NSWGR '42' |
| T 253 | 4-8-0 | SAR | 1067 | TGR examples |
| 752 | 2-8-2 | SAR | 1600 | Ex VR (N 477) |
| 409 | 4-8-2 + 2-8-4 garratt | SAR | 1067 | QR examples |
| 801 | diesel | SAR | 1600 | WAGR 'F' TGR 'Y' |
| 930 | diesel | SAR | 1600 | NSWGR '44' class |
| 41 | Model 75 Brill | SAR | 1600 | VR examples |
| BE 42 | economy carriage | V&SAR | 1600 | Joint stock VR & SAR |
| *Skipper* | 0-6-2 | | 610 | Queensland cane loco |

**Track Design**

The NRM has all three main Australian rail gauges on display and in operational use; broad gauge (1600 mm), standard gauge (1435 mm) and narrow gauge (1067 mm). South Australia was the only state in Australia to have used all of the three main gauges. NRM also maintains broad gauge and standard gauge diesel electric locomotives, and a narrow gauge steam locomotive — all in operational use for repositioning exhibits of all three gauges.

*Bob Sampson*

Vice – Chairman, National Railway Museum

## Where for the young?

Sir,

It was with full agreeance that I read your Editor's comments in your introductory page in *AME* (May/June 2003), regarding the welcome we do or do not give young people who may wish to participate in this hobby. Every time this subject comes up, I recall attending an Easter Convention in the late eighties at Tullamarine Live Steamers' old track near Melbourne Airport. There I witnessed a well known club boiler inspector, then in his 70's, giving a balling out to a young loco driver probably of about 16 or 17 years. The short version was that the lad was told to get the loco off the track, then was not allowed to do this himself but rather needed to have his father do it for him. Yes, I do know that these are the current rules but the way the lad was bellowed out, in front of an audience like that, worries me. About one hour later I noted the father and son packing up their equipment and leaving the convention, despite it being only Day One (Good Friday).

The boiler inspector died several years back and is lost to the hobby. But I sometimes wonder if the youngster ever drove or worked on another loco. And which is the greater loss?

I have just returned from the Triennial Meet at Train Mountain in the US. Seven days of great fun for all concerned. Despite the oft commented on legal and insurance situation in the US today there were numerous young people of 12 and 14 years driving trains around this, the world's biggest, miniature track.

The only criteria any person, of any age, needs to meet, prior to being allowed to go out on their own at TM, is to show they have reached the "age of reason" and are competent to drive the loco and train in question.

There were two youngsters there of about 15 years, with their SP Mikado and about 12 cars on behind. First out every morning and never back across the turntable until at least 10.00pm at night, with their wide, smiling faces covered in soot. Where is there a place for them in the current Australian situation??

*Russell Dunn*

Kitsap Live Steamers, Port Orchard, WA USA

## Rail joiners

Sir,

With regard to *Tracks 'n' Trees* in *AME* 108, I would like to take up a few points with what "Doc" advises his readers. All the information in his last writings was very interesting, and indeed contained some new stuff for me, but then at the end everything went bottoms up!

"Doc" gives a list of things to do when joining rail lengths, out of the 7 tips only 1 and 7 are of any use!! Rail joiners are for that purpose only, and any effort to use them for continuing an electrical circuit (in the open air) is wasting time and effort.

**In detail.**

Point 1. Yes brass and nickel-silver are the best materials for rails.

Points 2 -6. All of these will only bring you headaches!

Point 7. Adding power at several places around the circuit is ALWAYS better than just at the beginning, but for outdoor use there is only one way. Next to the rails (could be even under) you should use a good thick quality cable and feed from this to every piece of rail as a sort of ring main (it sounds and is a lot of work but reliability is worth it). Better still is to use several "ring mains" and insulating rail joiners, that way the circuit can be split into sections for running more that one train at a time. Simple electrics and a well designed control panel are all that is then needed.

Hopefully "Doc" will take these comments in the spirit that they are intended, to allow more people to get more enjoyment out of their hobby, and less problems.

*Andrew Mottram*

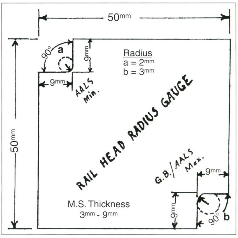
Haarlem, The Netherlands

## Rail head radius

Sir,

In the interests of pure science of physics and mechanical engineering in miniature, I have made a simple Go — No Go MS plate gauge to the dimensions shown which any club or individual is free to copy.

It consists of a square plate with two radii disposed at two diagonally opposite



corners of the plate. The two radii a and b are pre-drilled into two right angles cut into the corners of the plate. Radius a represents the min. rail head radius specified in the AALS Wheel and Track profile specifications for 7¼" track. Radius b is the maximum rail head radius allowed in the same specifications, which also corresponds with the 7¼" Society of Great Britain rail head radius standard.

In use the relevant radius is held against the rail to be tested. If no rock in the vertical plane is perceptible, the rail head radius is within specification and the loco can run. If the gauge rocks, the rail head is out of specification and the loco does not run.

To my knowledge, only four 7¼" tracks in the whole of the country comply. These are:

(1) Berry, NSW, (2) Campbelltown Railway, Narre Warren, Vic (3) Box Hill Miniature Railway, Vic and (4) Ballarat SME, Invermay, Vic.

I have not included Diamond Valley Railway, Eltham, Vic because their rail may be over specification. In the case of Invermay normal steel bar stock has been used with the 1.2mm – 1.6mm (approx) chamfer as referred to in ... *Letter Box*, cut in a single pass with an angle grinder. That club informs me further profiling is unnecessary due to the insignificance of the angles left and the fact that normal traffic quickly rounds off the rail head profile.

So successful has this simple operation been that they have profiled the 5" track as well.

Perhaps Barry Glover will be the first to congratulate the Ballarat Model Engineers in being the first club in Australia to modify bar stock rail to AALS Track Specifications. Any other club which complies may contact me and I shall be glad to consider operating my locomotive on their track.

*Robert Elliston*
Victoria

Sir

I read with interest your *News Desk* item describing Leigh Harris' huge 40km venture. I enclose a photograph of S304, the 5th of a fleet of 4 (7 proposed), VR 3-cyl. Pacific locomotives which ran through Locksley and were designed to run the 190 miles (306km) journey, Melbourne to Albury non-stop, each way everyday.

I wonder will this 3-cyl. 7¼" loco, built to original VR drawings (as closely as 1: 8 will sensibly allow), run on this scale 300km in one journey also.

Relating to the last issue 109 of *Letter Box*. I would be obliged if you would note that I have, in my assiduously impersonal letters published in recent issues of *Letter Box*, restricted my text to Engineering principle, specifications and practice only.

In accordance with your stated policy on letters in *Letter Box*, I would be glad if you would return to me the same courtesy. This saves both contributor and publisher the embarrassment of retraction of wrong and/or actionable statements, in fact or by inference.

*1:8 scale VR S class Pacific built by Robert Elliston as referred to in the text*

In order now to correct the wrong statements and inferences in *Letter Box* 109, I must now state:

1. The fault was not in the planning of my locomotive. The fault is in the 7¼" tracks not complying with AALS specifications.

2. I have been in contact with clubs and engineers for nearly 40 years.

3. I have been a club member for 14 years.

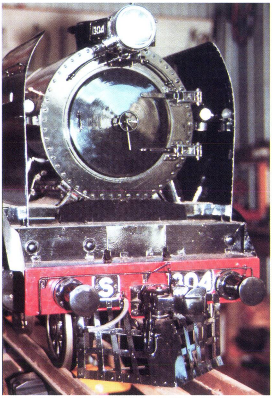
4. Because S304 is strictly to AMBSC/AALS 7¼" specifications it will run on any 7¼" track in Australia, compliant with AALS specifications. On last count that numbered four in the whole country. Possibly five.

Whether I choose to run S304 on non-compliant tracks is mine alone, and obviously has nothing to do with the construction of the loco.

*Robert Elliston*
Victoria

*(Robert, the "wrong statements and inferences" you refer to were simply the results of people trying to be helpful in reaching solutions to a problem which you raised, in the absence of any information given by you regarding experience, circumstances, etc. (i.e., your "assiduously impersonal approach"). Helping each other, after all, is what hobbies and clubs are all about. As you have said, in the end it comes down to a matter of your personal choice where you run your locomotive. I must make a point of visiting the Ballarat track some time soon.*

*As an editor I am disappoionted when people start talking about "actionable statements", particularly when no malicious intent is meant. This thread of correspondence is now ended ... Ed)*



*Front end view of Robert Elliston's S304*

## Letterbox Contributions

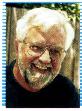
You are welcome to send letters by **mail** to:

PO Box 21, Higgins, ACT, 2615 or
**fax** to: (02) 6254 1641 or
**e-mail** to: ame@netspeed.com.au

As far as possible, *AME* is an open forum for all members of our hobby. Therefore, all expressions of fact or opinion as long as they are not libellous will be considered for publication.

Please type or clearly print your letters, as script is often difficult to interpret. Due to the popularity of *Letter Box* and the sometimes limited space available, letters of 400 words or less will usually have a better chance of being published.

# News Desk



### with David Proctor

Hello and welcome to a slightly new look *AME*. You may have noticed before you got to this page that we have made a change to our cover, have used colour throughout and introduced photos of all our regular columnists. There have also been a few minor layout changes. I have done a bit of experimenting in this issue and the last, most of which would not be obvious to you, the reader, but which should result in us using colour througout permanently. The main reason for the experimenting is to find ways of using full colour without an increase in cost.

In the last *News Desk* I made mention of the fact that some *Club Roundup* reports were getting a bit wordy. This time I have to say the same about some items for *Coming Events*. The *Coming Events* column is intended as a 'notice board' of events which are coming up in your club. In this issue I had to edit a couple down by about 60% as they were mini 'tourism' sagas in their own right. Club news and events are important but I'm sure we don't want them to take over the magazine.

## Plastic sleepers

Many clubs are using plastic sleepers for their railways these days for reasons of durability, ease of use and termite resistance. I believe most have been sourced from **Omnipol** in South Australia. Over the last few weeks some people have contacted me to see if I knew if Omnipol had closed down. Attempts by them to make contact have been unsuccessful, and I too have not been able to get through. Could someone let us know if Omnipol are still in business and if not, are there any other suppliers of plastic sleepers.

## From readers

Kevin Bruderlin from Newcastle has written in to tell me of 3 books which could be of much use to readers. *Steamboats and Modern Steam Launches*, edited by Bill Durham (Howel-North Books) has lots of information on plans for hulls, engines, flash boilers, etc. *Light Steam Power* is a magazine (2-monthly by J N Walton, Kirk Michael, Isle of Man UK, which deals with all sorts of steam vehicles, mainly on the road. *Doble Steam Cars, Buses, Lorries and Railcars* (Horne & Son) by J N Walton deals with all the experiments of Abner Doble and contains a wealth of information.

## Garden railways

If anyone has material which could be used as the basis of garden railway rolling stock construction articles, or is actually building some rolling stock, I would be pleased to hear from them. The popularity of the *EDWIN* series tells me that garden railways have become a very important part of our hobby.

## *AME* email address

By now you have probably noticed that *AME's* email address is now **ame@netspeed.com.au** I am reminding you again here as the old Bigpond address will cease to function on 15 September.

## General

I may have mentioned before that when I am in the last 3 weeks of putting an issue of *AME* together I usually do not have time to respond to emails and other queries because of the printing deadline. During this period, replies have to wait until the magazine has gone to the printers.

Finally, remember the query on 10¼" gauge locos in the May issue. I have had a couple of replies so far and when I have a bit more information it will be published.

— *David*

---

**Australian**
**Model**
**Engineering**

# New Subscription Form

**Post:** **PO Box 21, Higgins ACT 2615 Australia**
**Phone/Fax:** **(02) 6254 1641**
**Email:** **ame@netspeed.com.au**

I wish to begin subscribing to the ***Australian Model Engineering*** magazine for **one year** commencing with issue **110 — September-October 2003**

***Subscription rates*:-**

Australia **$38.00** *(Includes GST amount of $3.45)*
New Zealand **A$47** (Air Mail) Other Countries **A$58** (Air Mail)

☐ Tick this box if this is a **gift subscription**. What is the occasion (e.g. Birthday) ................................
Name of person sending gift ................................................................................................

Subscriber's Name ................................................................Phone ( ..... ) ................................

ADDRESS ................................................................................................................

................................................................................................ Post Code ..........................

Enclosed a **Cheque / Money Order / O/Seas Bank Draft**
or please debit my **Bankcard / VISA / MasterCard** **A$** ........

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

**Card Expiry Date**
........../..........

Cardholder's Signature ...................................................... Name on card (print) .........................................

Sept-Oct 2003

## Classifieds

### Casting kits for ¼ scale Rider Ericsson hot air pumping engine for sale

- As described in *Steam & Stirling Engines You Can Build*. Nine aluminium castings $380 (plus post). Graeme Johnson (03)5831 7574

### 4 x 5" gauge riding trolleys for sale

- Featuring enclosed sides, foot wells and ends, safety chains, varnished ply seats, hand rails, tuscan painted bodies, chevron safety painted ends. Non braked $400 ea
- 5" gauge 50 class castings, drawings and rolling T class tender frame to E J Winter design. $900. Lorne 0409 983 268

### 8 Hot Air Engine Kits to TURN UP and Assemble

- For prices please email: edmar_jones@hotmail.co or phone Edwyn Jones (07)3351 4454

### NSWGR C38 class 5" live steam project

- Full set Winter's castings, all drawings, certified boiler, many extras, e.g. loco, tender and bogie frames, axles, all bearings, injectors, gauges, cab fittings, smokebox, many detail parts. $8,000 ono (02)9533 4045

### Model machining services

- Examples:- lathe, milling, tapping, boring. Casting done to your drawings. Supplier of tools, e.g. drills, lathe, milling cutters. For further details write, fax, phone Stephen Palmer, PO Box 95, Windsor NSW 2756. Fax (02)4572 5679, Phone (02)4574 0153

### 5" *Speedy* for sale

- Copper boiler, current certificate, Sandberg steam pump, ride-on tender, Sandberg bogies with vacuum brakes. $8,500 neg. Phone Bill (02)6492 0332

### Machining-fabricating capacity available

- Turning, milling, welding, tooling, will tackle anything. Frank Zizza, 6 Elizabeth St. Euroa. Vic 3666. (03)5795 1551

### Vertical boiler for sale

- 36" dia., 40" high AGL Sydney 9.9.49, Galloway tubes, VG condition, TP.200-WP.100, Serial 8B340. Retested 7.12.02 Tomlinson Adelaide. Certified JBD, kP1400. Suit club stationary engines, steam launch. Suit wood or oil fired. $3,500. Contact Ted (08)8345 4353 or Barry (08)8344 6003

### For Sale –7¼" Gauge *L'il Lima* 2-4-0

- Keith Watson design, Briggs type steel boiler to 100psi, AMBSC boiler certificate. Injector, twin axle pump, tender hand pump, vacuum brake to tender and train pipe. Head and cab lighting with 6v battery. Loco comes with trailer (Vic registered), tailored canvas cover, and storage trolley. $16,000 ono. Further details and photo, Bill Chalmers (02) 6072 3582. Email: bchalmers@albury.net.au

### 7¼" Railmotor No.1 for sale

- Copper boiler, current boiler certificate, excellent condition. Contact Shawki on (02)4736 3035

### 5" *Blowfly*, tender and passenger vehicle for sale

- 2 years old, boiler certificate current, good goer. $10,000. Ph. (03)5275 4862

### 7¼" gauge *L'il Lima* 2-4-0 n.g. steam loco for sale

- *Brushy Creek*, Briggs boiler w/- water tube firebox walls, Westinghouse air compressor & operating air brake, scale cab fittings. Possibly the finest example of this Keith Watson design built. $20,000
- 5"g. Victorian Railways V class Vauclain compound
- 2-8-0 steam locomotive under construction. Meticulous attention to detail. A masterpiece in the making! Offers requested.

  Both from the workshop of the late master craftsman, Jeremy Johnstone of Mooroolbark, Vic

### For sale — British diesel shunter 5"

- 08 class 0-6-0, 3hp Tecumseh engine, with riding car. $3,500. (02)9484 7583

### Myford vertical slide for sale

- Double swiveling type, unused. Price $400. (new price $895). (03)9379 2251

### 7¼"g. early American type 4-4-0 and tender for sale

- Recently completed, 8" copper boiler, current safety certificate, Walschaerts valve gear, air brakes. Livery: yellow with black and silver trim. Polished timber sheeted cab. Must reluctantly sell for health reason. $13,000. Ph. (07)4779 6812 (Townsville, Qld).

### Gauges 1 and G locos for sale

- JNR C11 tank engine 2-6-4 live steam gauge 1 (45mm track), as new, never been used. Fuel: distilled water-metho. Has manual, parts list, spare bits and pieces. $3200 ono
- GE U25 diesel, G gauge, analogue sound, lights & smoke $295 ono
- 0-4-0 switcher w/ sound tender, G gauge, smoke & lights $220 ono
- Also have approximately 200 feet of straight brass track in various lengths. Sell at ($7.00 per foot)
- 8 foot diameter curve track, 32 pieces (16 pieces form one 8 foot diameter circle). Sell at ($190.00 for 16 pieces)
- 10 foot diameter curve track 24 pieces (12 pieces form one 10 foot diameter circle). Sell at ($230.00 for 12 pieces). Phone Nigel (02)9777 4668 AH.

### Belpaire boiler patterns needed to borrow or hire for

- Barrell of 8", outer firebox length 235mm, height 275, top width 245, bottom width 208, suitable for 3 or 4mm copper. Will pay all associated costs of transport, etc. Values given are from my own design, anything close will suffice, except I have boiler tube and max width between frames of already built 2-6-2 rolling unit is 214mm. Please contact Mike New on (02)9449 4415 or mnew1@csi.com

## Subscribers Free Market

### FOR SALE

**2" scale Cliff & Bunting traction engine**, completed 2001, trophy winner. Copper boiler, current certificate. $9,500. G Punter, Bundaberg Qld (07)4152 7758

**Myford Compound Vertical Slide** as new condition. $300. Ph. John (02)6765 3783

**Myford Super 7 lathe**, mint condition. $4,000 (02)6251 4417

**7¼" bogie carriage and tanker**, both vacuum braked with large reg. trailer. The lot $2,300. Ted (02)9746 7738

Magazines ***Australian Model Engineering*** from March-April 1999, 25 issues, good condition. (02)4753 6773

Set of **spur gears for 2" scale version of L C Mason's *Minnie*** traction engine. Contact Graham at graymaceng@xtra.co.nz

**5" SMR 10 class**, boiler complete, hydrostatically tested, most castings, full set Winter's plans. $2,000. Dave Adams (02)4739 2648

### WANTED

***Locomotives Large and Small*** magazine, issues1-3 incl, 5-10 incl. To complete collection. Ph. (08)9367 3860

**Diff gears for 3" scale Foden truck**. Contact John on 0412 036 055

### Classified rates

- $3.85 (GST incl.) per line as published (including heading).
- Don't send payment with ad, we'll invoice you after publication. No limit to the number of words.

### Subscribers Free Market conditions

- Non-commercial only, at the publisher's discretion.
- Maximum of twenty words, including your contact name, phone number or address.
- On special form provided. (March & September issues).
- 5" gauge or larger locomotives (for sale) are not eligible.
- Only one entry per issue.

### FOR SALE

**7¼" gauge 0-4-0 rod driven electric loco**

Shunter style, good performer
48 volt new batteries. $3,500.
Ph. Reg on (03) 9758 3514

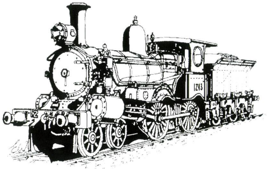
E. & J. WINTER Present..

The NSWGR Z12 class 4-4-0 locomotive in 5" gau

Award winning examples of this elegant little 19th century locomotive can be found on many club and private tracks around Australia. This includes the engine featured in AME magazine No.61, a great credit to her novice builder. Suitable for first-time builders or experienced locosmiths looking for an intrinsically simple design. Light-weight and small size makes a readily transportable 5" gauge locomotive.

For casting list and prices please write, fax or phone: **E. & J. Winter**
**PO Box 124, MEDOWIE, NSW, 2318**
**Phone & fax: (02) 4981 7999**
e-mail: ejwinter@ozemail.com.au

Send for our 44 page illustrated handbook just $7.00 (inc. GST) posted.



Z12

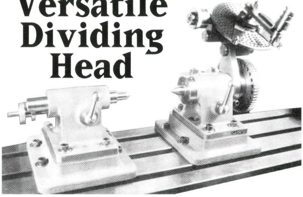
Hobby MECHANICS

*More Details on our Website:*
**www.hobbymechanics.com.au**

**Suppliers of Machinery and Tools for Working in Metal and Wood**

**By agreement with N.S. & A. HEMINGWAY, Rochdale, UK, we are pleased to announce the availability of items to construct the world-renowned:**

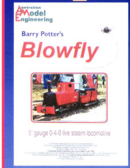
**Versatile Dividing Head**



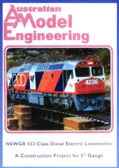
**Pre-cut Gears and Worms are available, as well as castings and blanks for plates. Please send S.A.E.for Details and Prices.**

JOHN STRACHAN
**HOBBY MECHANICS**
P.O. BOX 785, KENMORE QLD 4069 • **Phone (07) 3374 2871**
• Fax (07) 3374 2959 • E-mail: jstrach@powerup.com.au

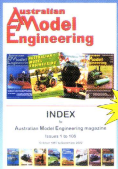
AME Manuals


Australian Model Engineering
Barry Potter's
Blowfly
5" gauge 0-4-0 live steam locomotive

Barry Potter's Blowfly Project
Complete series, A4: $55.00


Australian Model Engineering
42216
NSWGR 422 Class Diesel Electric Locomotive
A Construction Project for 5" Gauge

AME 422 Project
222 pages, A4: $75.00


Australian Model Engineering
INDEX
to
Australian Model Engineering magazine
Issues 1 to 105

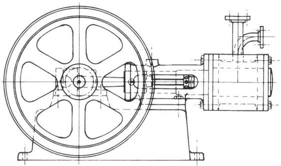
AME Index for issues 1 to 105
150 pages, A4: $19.95
NEW and revised

All from AME Retail
see page 67 for details

Project manuals are photocopies of original articles.
422 manual contains colour pages and many fold-out pages.

E. & J. WINTER Present... Stationary Engines

**Design HSE-1: a new horizontal steam engine for the beginner**



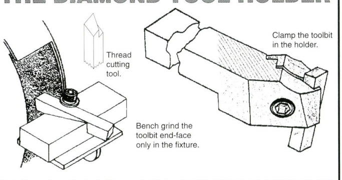
5/8" bore and stroke with *twin* 3-3/8" diameter flywheels.
Clear and complete modern plans.
A comprehensive casting set, all in easy to machine gunmetal (except for the flywheels).

**Plans** (2 sheets): $17.00
**Casting set** (15 items): $106.90 Allow P&P for 3kg.

nd prices please write, fax or phone: **E. & J. Winter**
**Box 124, MEDOWIE, NSW, 2318**
**Phone & fax: (02) 4981 7999**
-mail: ejwinter@ozemail.com.au

Send for our 44 page illustrated handbook just $7.00 posted.

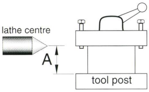
THE DIAMOND TOOL HOLDER



Each kit consists of the toolholder, grinding fixture, Tool Bit, Allen key and detailed instructions.

| Type | L.W.H. | Dim A | Sq. tool bit | Price | |
|---|---|---|---|---|---|
| T6 | 52 x 9.5 x 9.5 | 6mm (1/4") | 1/8" | $99 | **Price includes GST & Post within Australia** |
| A8 | 77 x 12 x 11.5 | 8mm (5/16") | 1/4" | $125 | |
| A9.5 | 77 x 12 x 13 | 9.5mm (3/8") | 1/4" | $125 | |
| B16 | 77 x 14.3 x 15 | 16mm (5/8") | 1/4" | $125 | |

Roughing and finish cuts, end and shoulder facing, plus 55 or 60 degree threading. All from a standard square HSS toolbit! Before ordering, measure the height from the tool-rest landing to the lathe centre (Dim A on sketch). Select the kit that suits your application.



**D & P BURKE TOOLMAKERS**
27 Woodstock Rd. Mount Waverley, 3149, Victoria
Phone (03) 9807 6316 Fax (03) 9807 9620
We accept Bankcard, VISA and MasterCard
BURKE-C7.CDR

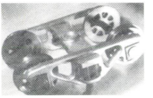
Put it on your calendar

Great fun! 5" and 7¼" track in scenic surrounds. Traction engines! Stationary models! Full-size historic engines! HO scale layout! Loads of tourist attractions!

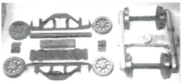
enquiries: David Font on (02) 6921 4762
e-mail: dfont@tpg.com.au

Hobby Mechanics

*More Details on our Website:*
**www.hobbymechanics.com.au**
**Suppliers of Machinery and Tools for Working in Metal and Wood**



**Budget Bogies**



*Based on Queensland Government Railways Design*

| Item | 7¼" Gauge | 5" Gauge |
|---|---|---|
| Bogie Frames, Aluminium | $65.50 set | $37.90 set |
| Axleboxes C.I. One stick | $12.50 ea | $8.20 ea |
| Wheels | $25.30 ea | $10.80 ea |
| Springs, set of 8 | $24.00 set | $22.50 set |
| Complete set of parts | $330.50 set | $185.95 set |
| Ready to run, anti-friction bearings | $445.50 set | $335.95 set |

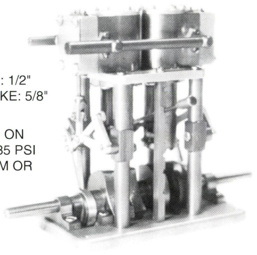
Please add 10% GST to the above prices

JOHN STRACHAN
**HOBBY MECHANICS**
P.O. BOX 785, KENMORE QLD 4069 • **Phone (07) 3374 2871**
• Fax (07) 3374 2959 • E-mail: jstrach@powerup.com.au

**TWIN CYLINDER VERTICAL REVERSING STEAM ENGINE ASSEMBLY KIT**

BORE: 1/2"
STROKE: 5/8"

RUNS ON
5 TO 35 PSI
STEAM OR
AIR



Completely machined. All Hardware included.
Only Hand tools required for assembly.
**MODEL TVR1A $570**

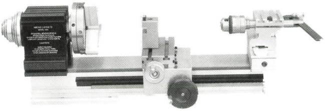
**EMCO MACHINE TOOLS AUSTRALIA PTY LIMITED**®

2/247 Rawson Street
Auburn, NSW, 2144
Australia

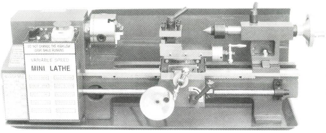
Phone: (02) 9648 4377
Fax: (02) 9648 4150
ACN 002 506 139

# TAIG MACHINERY

Taig micro lathe 4 ½" $489.00
2 Year Warranty



Mini lathe 7x12" variable speed $920.00



**Mini Mills also available**

59 Gilmore Crescent — Ph: 02 62815 660
Garran ACT 2605 — Fax: 02 6285 2763
Email: k1ergo@netspeed.com.au

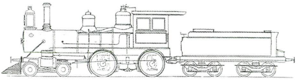
---

## Hobby Mechanics

*More details on our website:*
**www.hobbymechanics.com.au**

**Suppliers of Machinery and Tools for Working in Metal and Wood**

## We Supply Plans & Castings for Queensland Locomotives



**• QGR A12 4-4-2 LOCOMOTIVE •**

In 1878 the Queensland Government Railways received three 4-4-0 locomotives from the Baldwin Locomotive works which were named the A12 Class. In 1890 the local Brisbane firm of Evans Anderson and Phelan built 25 of the latest version and this is the model we offer.

| LOCO | NO. OF DRAWINGS | NO. OF CASTINGS |
|---|---|---|
| 5" A10 | 12 | 76 |
| 5" A12 | 12 | 73 |
| 5" PB15 | 12 | 73 |
| 5" AC16 | 13 | 74 |
| 5" BB18-1/4 | 10 | 85 |
| 5" C17 | 6 (of 12) | 57 |

Plans now available for A10 in 7-1/4" gauge

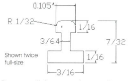
## HOBBY MECHANICS

PO BOX 785, KENMORE QLD, 4069 • **Phone (07) 3374 2871**
• Fax (07) 3374 2959 • E-mail: jstrach@powerup.com.au

---

# Rishon Locomotives

Small scale live steam locomotives



Brass rail for garden railways. $4.50 per 1.8m length plus freight.

*Coffee Pot* in gauge 1

PO Clunes, NSW, 2480 — Ph: (02) 6629 1115
rishonloco@optusnet.com.au

---

# Rolling Stock and Detail Components

**Australian Distributors for:**

**Doug Hewson (Models) UK**
Rolling stock components

**AME 422 class loco detail parts**

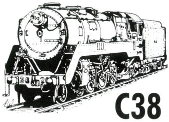
For more information, send a stamped DL size self-addressed envelope to:

**Barry Glover**
31 Spinks Rd. CORRIMAL, NSW, 2518
Ph (02) 4284 0294 — Fax (02) 4283 2331

---

# E. & J. WINTER
## Model Engineering Supplies

**An ideal start to the world of miniature steam...**

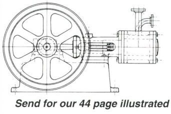


**C38**

Professional quality, fully detailed plans by Ernest Winter. Comprehensive casting sets for a growing range of Australian steam locomotives including: NSWGR 12, 13, 30, 32, 35, 36, & 38 classes; SMR 10 class; VR K class. All in the popular 5" gauge. NSWGR 36 class also available in 7-1/4" gauge.

**Stationary and Marine steam...**

The entire works of O. Burnaby Bolton, 23 stationary and marine steam engines (incl. triple expansion engine). 13 IC engines and over 60 live steam locos from O to 7-1/4"g. **Materials, Tools, fasteners** etc., for the model engineer.



**Plus More...**

**Plans** from Nexus (*Model Engineer)* and Don Young.
**Books** from Nexus, TEE and Camden.
**Castings** for many Nexus and Don Young designs.

***Send for our 44 page illustrated handbook just $7.00 posted.***

**E. & J. Winter — Bolton Scale Models**
**PO Box 124, MEDOWIE, NSW, 2318**
**Phone & fax: (02) 4981 7999**
e-mail: ejwinter@ozemail.com.au

# AME Retail

## BOOKS

| | |
|---|---|
| A Compendium of NSW Steam Locomotives | $53.85 |
| Among Their Favourites** | $48.50 |
| An Era in Steam by Ron Preston | $39.95 |
| Australian Steam Locomotives 1896-1958 | $72.00 |
| Australia's Last Giants of Steam, David Burke, | $55.00 |
| Away with Steam** | $28.00 |
| Bridges Down Under (soft cover)** | $44.00 |
| Byways of Steam - 7 | $31.00 |
| Byways of Steam - 9 | $31.00 |
| Byways of Steam - 10 | $34.00 |
| Byways of Steam - 11 | $37.50 |
| Byways of Steam - 12 | $37.50 |
| Byways of Steam - 13 | $42.00 |
| Byways of Steam - 14 | $37.50 |
| Byways of Steam - 16 | $42.00 |
| Byways of Steam - Encore | $38.50 |
| Coaching Stock of the NSW Railways Vol.1** | $90.00 |
| Days of the Goods Trains | $55.00 |
| Early Diesel and Elec. Locos of the NSWGR | $55.50 |
| Four Decades of Railway Photography** | $37.00 |
| Full Steam Across the Mountains | $36.00 |
| Green Diesels - 40 and 41 classes (NSW) | $55.50 |
| On Southern Lines by Ron Preston | $33.00 |
| Rail Scene NSW Vol.12 (soft cover) | $43.00 |
| Remember When | $50.00 |
| South Maitland Railways | $45.00 |
| Standards in Steam the 50 class (hard cover)** | $51.00 |
| Standards in Steam 53/55 class (soft cover) | $35.00 |
| Standards in Steam 53/55 class (hard cover) | $60.00 |
| Tasmania's Hagans by Geoff Murdoch | $24.95 |
| The P Class | $49.95 |
| The 34 & 35 classes | $55.50 |
| The Blowfly Manual | $55.00 |
| The Model Injector (new) | $10.00 |
| The Shimmer of Steel | $74.00 |

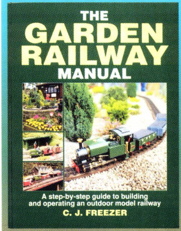
** indicates low stock

| | |
|---|---|
| AMBSC Code Part 1 (copper boilers) | $15.00 |
| AMBSC Code Part 2 (steel boilers) | $15.00 |

(Boiler code price does not include postage and handling fees)

**New Book available**

## A must for garden railway enthusiasts!


THE GARDEN RAILWAY MANUAL

A step-by-step guide to building and operating an outdoor model railway

C. J. FREEZER

Once you've built our current project *Edwin* you will need somewhere to run it. AME Retail has a book for you with just about all the information you'll need!

C.J.Freezer provides a practical overview of the garden railway, covering both the traditional raised system and the ground-level type that is rapidly gaining in popularity. Although the main thrust of the book is towards 32mm and 45mm track gauges, he points out that OO and N garden railways have been built successfully. Some of the subjects covered include: gauges and scales, surveying, track construction, electricity, buildings, points and signals, planning the layout, civil engineering, track laying, live steam, ponds and water, passenger carrying.

**Price: $39.95 incl postage.**

### 422 class 5" gauge locomotive castings

Cabs: $515.00 per pair.

Bogie frames with dummy brake cylinders: $394.00 per pair.

Cabs and bogies set $905.00.

### 422 class 5" gauge locomotive Construction Manual

Price: $75.00. As many back issues containing the series are out of print we are offering this 200 page collection, A4 size manual (bound photocopies of all articles).

---

**Golden Arrow** (aprox 1.5m model steam launch) drawings are full-model size (1 sheet hull template & 1 sheet boiler) $16.00

---

### Bettendorf bogie kit

5" gauge (for scale wagons only, not suitable for riding cars). Kit comprises of two bogies made up of 4 side frames, 2 bolsters, 8 cast wheels, 16 springs and 4 axles. $275 per kit.

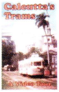
---

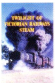
**New revised AME Index for issues 1 to 105: $19.95**

Queensland Railway's BB18-1/4 Print $34.95 ea.

## Videos

| | |
|---|---|
| 9461 Freight - A Driver's View | $29.50 |
| Calcutta's Trams | $35.00 |
| China - Last of the Steam Dragons | $29.50 |
| Days of Steam No.2 | $41.50 |
| Junee Roundhouse Celebrations 1997 | $19.95 |
| Last Train to... Last Run of... | $29.50 |
| Magic of Steam | $41.50 |
| Peter Peckett & Puffing Billy | $29.50 |
| Pichi Richi & the Northern Aust' Dream | $35.00 |
| R711 Back in Steam | $29.50 |
| Rail Motor Journeys over Lost VR Lines | $29.50 |
| Rail Motors Remembered | $29.50 |
| Riding the Beechy & other NG Lines | $29.50 |
| Steam and Diesel Review 1997 | $44.50 |
| Steam and Diesel Review 1998-1999 | $46.50 |
| Steam and Diesel Review 2000-2002 | $46.75 |
| Steam Around the State | $29.50 |
| Steam in Focus No.1 | $29.50 |
| Steam in Focus No.2 | $29.50 |
| Steam in Focus No.3 | $29.50 |
| Steam in Focus No.4 | $29.50 |
| Steam in Focus No.5 | $29.50 |
| Steam in Focus No.6 | $29.50 |
| The 8mm Collection - Branch Lines | $36.00 |
| The Darjeeling Himalayan Railway | $59.00 |
| The Great 100 Working | $41.50 |
| Twilight of Victorian Railways Steam | $29.50 |





**e-mail direct to AME Retail:**
**jpoliver@webone.com.au**

Prices include GST, postage and packaging Australia wide except where indicated.

Payment by cheque, money order, Bankcard, VISA or MasterCard to:

**AME Retail**

PO Box 1403, Tuggeranong, ACT, 2901
Phone / Fax : (02) 6292 1938
http://www.ameng.com.au

# Plough Book Sales

| | |
|---|---|
| A History of Aircraft Piston Engines, 244 pages | $58.00 |
| A.H. McDonald, Industrial Pioneer, 318 pages | $33.00 |
| A-Z of British Stationary Engines Volume Two: L-Z, 128 pages | $43.45 |
| Bentley Br2 World War 1 Rotary Aero Engine, 95 pages | $49.50 |
| Boiler Operator's Handbook by George Preston, 92 pages | $29.00 |
| Caterpillar Cronicle: History of the World's Greatest Earthmovers | $69.95 |
| Caterpillar Seventy-Five Years by Thomas Wilk, 279 pages | $110.00 |
| Crawler Tractor Scrapbook Part One by Richard H. Robinson, 160pp | $54.95 |
| Crawler Tractor Scrapbook Part Four, 160 pages | $54.95 |
| Diesel's Engine Vol. I, From Conception to 1918, by Cummins, 768pp | $135.00 |
| Experimental Flash Steam, 189 pages | $51.50 |
| "K1" 1st Garratt in Tasmania, 235 pages | $170.00 |
| Major Piston Aero Engines of World War II, 192 pages | $135.00 |
| Producer Gas for Motor Vehicles, 194 pages | $31.50 |
| Rack Railways of Australia by David Jehan, 112 pages | $27.50 |
| The Pioneer of the Road, Australia's First Self-Powered Vehicle | $22.00 |
| Guide for the Boiler Attendant's & Engine Driver's Certificate, 269pp | $27.45 |
| Stationary Steam Engines of Gt. Britain Vol 6. 256 pages | $96.50 |
| Traction Engine Design and Construction 1900 - 1930, 342 pages | $165.00 |
| Beyer, Peacock locomotive builders to the world, 302 pages | $132.00 |
| La Locomotive A Vapeur by A. Chapelon (ENGLISH edition), 631pp | $210.00 |
| Practical Distiller (1910), 156 pages | $22.00 |
| The Red Devil and other Tales from the Age of Steam, 522 pages | $105.00 |
| Windmills & Wind Motors (1910), 78 pages | $17.00 |
| A Practical Treatise on Hot Air Engines by E.T. Westbury | $38.00 |
| An Intro to Low Temperature Differential Stirling Engines, 88 pages | $29.50 |
| Building Simple Model Steam Engines by Tubal Cain, 107 pages | $16.95 |
| Building Simple Model Steam Engines Book 2 by Tubal Cain, 106pp | $18.95 |
| Building the Atkinson Differential Engine by Gingery, 112 pages | $37.00 |
| Building the Climax by Kozo Hiraoka, 224 pages | $121.00 |
| Building the Henly 'Junior' Steam Engine, 6 pages | $8.00 |
| Building Sterling 1 A One Piston Hot Air Engine, 25 pages | $23.00 |
| Building the Stuart Beam Engine by A. Smith | $26.00 |
| Do It Yourself Vacuum Forming for the hobbyist, 125 pages | $30.25 |
| Gas Turbine Engines for Model Aircraft by Kurt Schreckling, 106pages | $49.50 |
| Making Clocks by Stan Bray, WPS No.33, 124 pages | $19.95 |
| Model Boilers and Boilermaking by K.N.Harris | $51.50 |
| Model Boilermaking Designing Making & Testing by E.L. Pearce | $22.00 |
| Model Engineering, A Foundation Course by Peter Wright, 408pp | $45.00 |
| Model Hit and Miss Engine 1-1/8" bore 1-1/2" Stroke, 41 pages | $34.00 |
| Model Petrol Engines - Design & Construction | $22.00 |
| Model Stationary and Marine Steam Engines, 153 pages | $47.50 |
| Model Stationary Engines, Their Design and Construction, 72 pages | $22.00 |
| Model Turbo-Prop Engines by Kurt Schreckling | $49.50 |
| So You Want to Build a Live Steam Locomotive, 161 pages | $86.90 |
| Steam & Stirling Engines You Can Build Book 2, 200 pages | $99.00 |
| Steam and Stirling Engines You Can Build by W. C. Fitt, 160 pages | $99.00 |
| The Model Locomotive from Scratch by B. Terry Aspin, 92 pages | $29.95 |
| The Stirling Engine Manual by James Rizzo, 195 pages | $95.00 |
| Twin Cylinder Horizontal Steam Engine plans, 6 pages | $7.50 |
| Design, Construction & Operating Principles of Electromagnets | $20.50 |
| Strictly I.C. magazine | $20.50 |
| Fuel from Water Energy Independence With Hydrogen, 251 pages | $62.00 |
| Ignition Coils and Magnetos in Miniature, How to build them | $60.00 |
| High Frequency Induction Heating (1944), 235 pages | $29.50 |
| How to Build a Solar Cell that Really Works, 22 pages | $12.00 |
| How to Run Three Phase Motors on Single Phase Power, 20 pages | $7.50 |
| Secrets of Lead-Acid Batteries, 44 pages | $12.00 |
| Tesla's Engine A New Dimension For Power, 224 pages NEW | $42.00 |
| The Old Outboard Book (third edition), 309 pages NEW | $39.95 |
| The Tesla Disc Turbine by W.M.J. Cairns, 34 pages | $23.00 |
| 507 Mechanical Movements (1893), 122 pages | $19.50 |
| Advanced Machine Work (1925 workshop), 800 pages | $73.00 |
| Bent Iron Work Including Elementary Art Metal Work, 160 pages | $24.50 |
| Black Powder Manufacturing, Testing & Optimising, 208 pages NEW | $60.00 |
| Blacksmith Shop & Iron Forging, 96 pages | $18.00 |
| Build an Oil-Fired Tilting Furnace by Steve Chastain, 192 pages | $45.00 |
| Building a Small Lathe by L.C.Mason, 82 pages | $33.50 |
| Farm Blacksmithing Practical Hints for Handy-Men, 272 pages | $31.95 |
| Forge Craft (1913) by Charles Philip Crowe, 175 pages | $24.50 |
| Foundry Manual (1958 US Navy publication), 300 pages | $48.50 |
| Grinding, Lapping & Honing, 78 pages | $22.00 |
| Hardening, Tempering, Annealing and Forging of Steel, 288 pages | $24.50 |
| How I pour Babbitt Bearings by Vincent R. Gingery, 43 pages | $19.00 |
| How to Build a Forge, 15 pages | $12.00 |
| How to Run a Metal Working Shaper & Drill Press, 48 pages | $17.00 |
| Indexing Tricks (1903 milling machine work), 31 pages | $9.75 |
| Iron Melting Cupola Furnaces for the Small Foundry, 129 pages | $41.00 |
| Lapping & Polishing by E.K. Hammond | $20.00 |
| Lathe Accessories How to make & use them, 112 pages | $26.00 |
| Lil Bertha Electric Furnace, 67 pages | $22.00 |
| Machine Shop Methods by Lorus J. Milne, 376 pages | $46.00 |
| Machinery Handbook 26th Edition (tool box edition), 2511 pages | $224.40 |
| Making Crucibles by Vince Gingery, 60 pages | $22.50 |
| Melting & Casting Aluminium (1925), 253 pages | $24.50 |
| Milling Machine Practice from Cincinnati Milling Machine Co. 28pp | $9.50 |
| New Edge of the Anvil A Resource Book for the Blacksmith, 243pp | $65.45 |
| Practical Lessons in Metal Turning & Screwcutting, 178 pages | $35.00 |
| Practical Metal Turning by Joseph Horner, 404 pages | $51.50 |
| Punches Dies and Tools for Manufacturing in Presses | $58.00 |
| Secrets of Building a Plastic Injection Molding Machine, 127 pages | $36.50 |
| Simple Workshop Devices by Tubal Cain, WPS No. 28, 140 pages | $18.95 |
| Tabletop Machining A basic approach to making small parts | $90.00 |
| The Beginners Guide to the Lathe by P. Marshall, 93 pages | $22.00 |
| The Care and Operation of a Lathe (1942), 105 pages | $18.00 |
| The Complete Handbook of Sand Casting by C.W. Ammen, 238 pp | $40.90 |
| The Design and Use of Instruments and Mechanisms | $33.50 |
| The Flowerpot Crucible Furnace by L. Oliver II, 34 pages NEW | $16.00 |
| The Machinist's Bedside Reader, Projects, hints, tips, 210 pages | $49.50 |
| The Machinist's Second Bedside Reader by G. Lautard, 213 pages | $55.00 |
| The Machinist's Third Bedside Reader by G. Lautard, 250 pages | $68.20 |
| Treatise on Milling and Milling Machines (1919), 409 pages | $34.00 |
| Turning Lathes: A Guide to Turning, Screwcutting, etc, 432 pages | $60.00 |
| "Uncle" Dave Gingery's Shop Note Book 1, 59 pages | $20.00 |
| Ways & Means (1892 machinist book), 158 pages | $24.50 |
| Zeus Precision Data Charts and Ref. Tables (Metric), 28 pages | $12.50 |

We handle many other modeling, railway and metalworking books from the UK and the USA for a complete catalogue of over 6000 titles please send $2.50 (Payment may be by postage stamps).

**Or check out our web site at www.ploughbooksales.com.au**

Please allow 12-15 weeks delivery for some items. Payment can be made by Bankcard, VISA card, Mastercard, cheque or money order to:

**Plough Book Sales**
PO Box 14, Belmont, VIC, 3216
Phone (03) 5266 1262 Fax: (03) 5266 2180

**Postage and Handling Charges**

| Order Value | Postage Charge |
|---|---|
| $0 - $10 | $2.75 |
| $10 - $20 | $3.85 |
| $20 - $60 | $6.60 |
| $60 - $165 | $10.45 |
| Over $165 | Free |